ELECTRICAL TIMES

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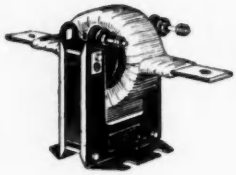
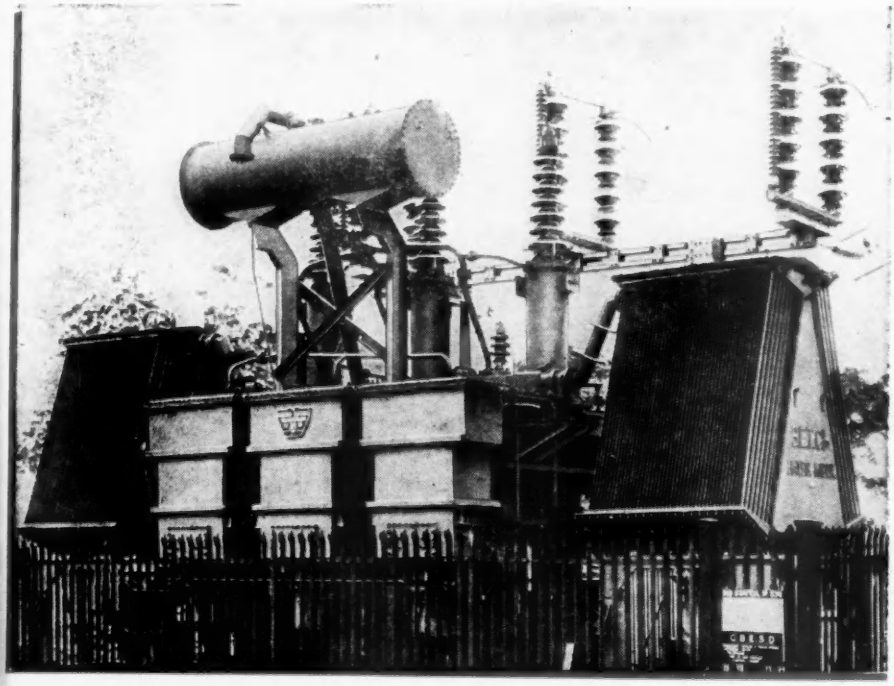


15lb. B.E.T. transformer to protect 60 tons



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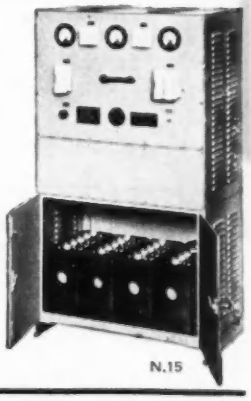

N.15

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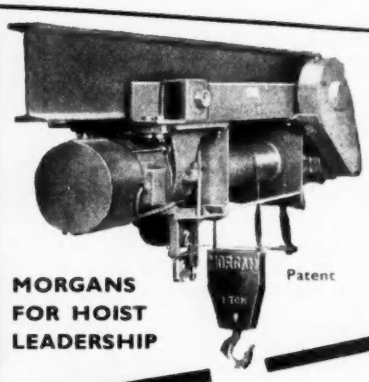

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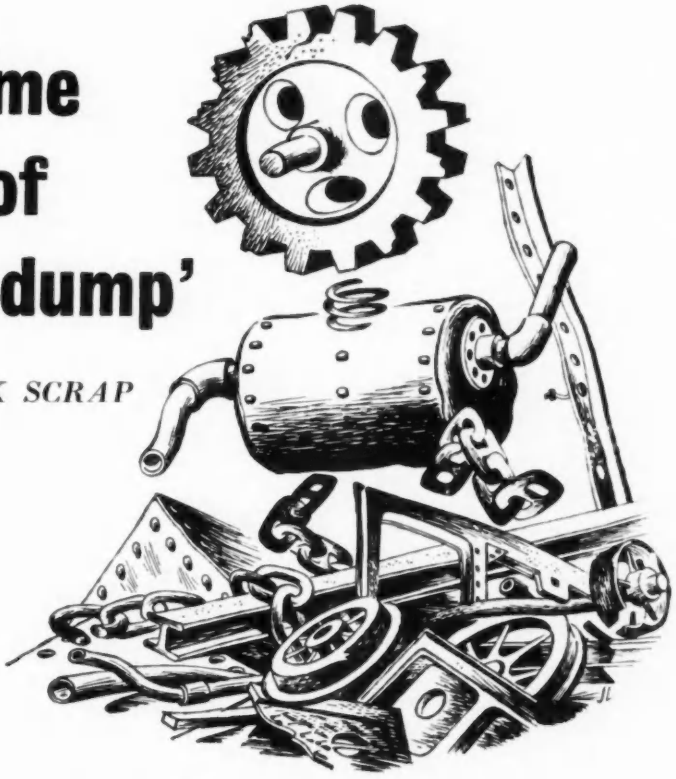

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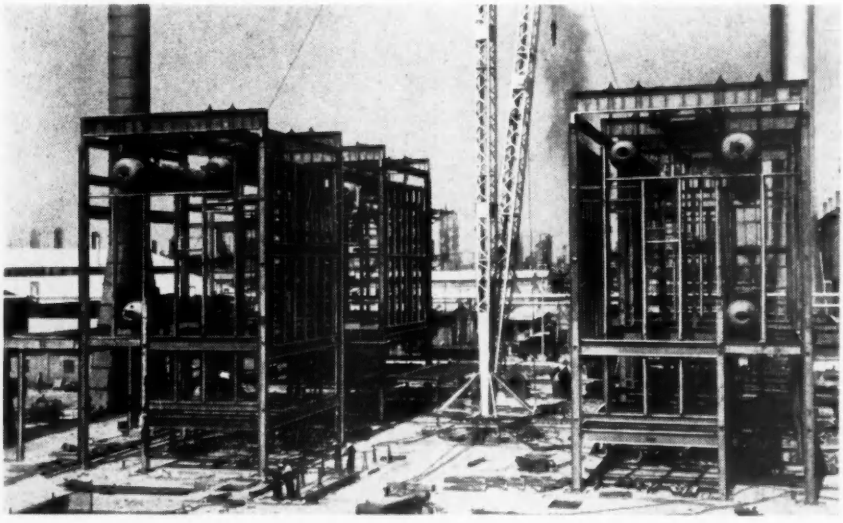

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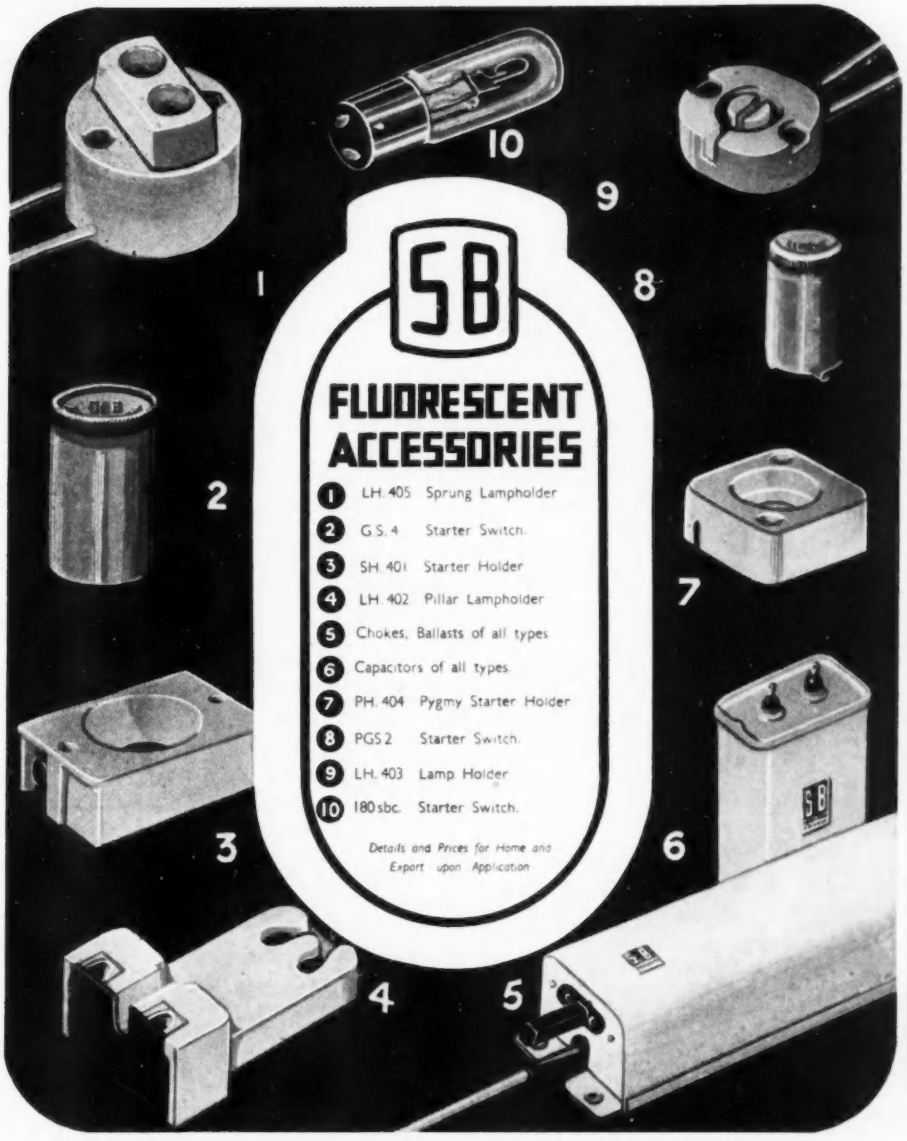

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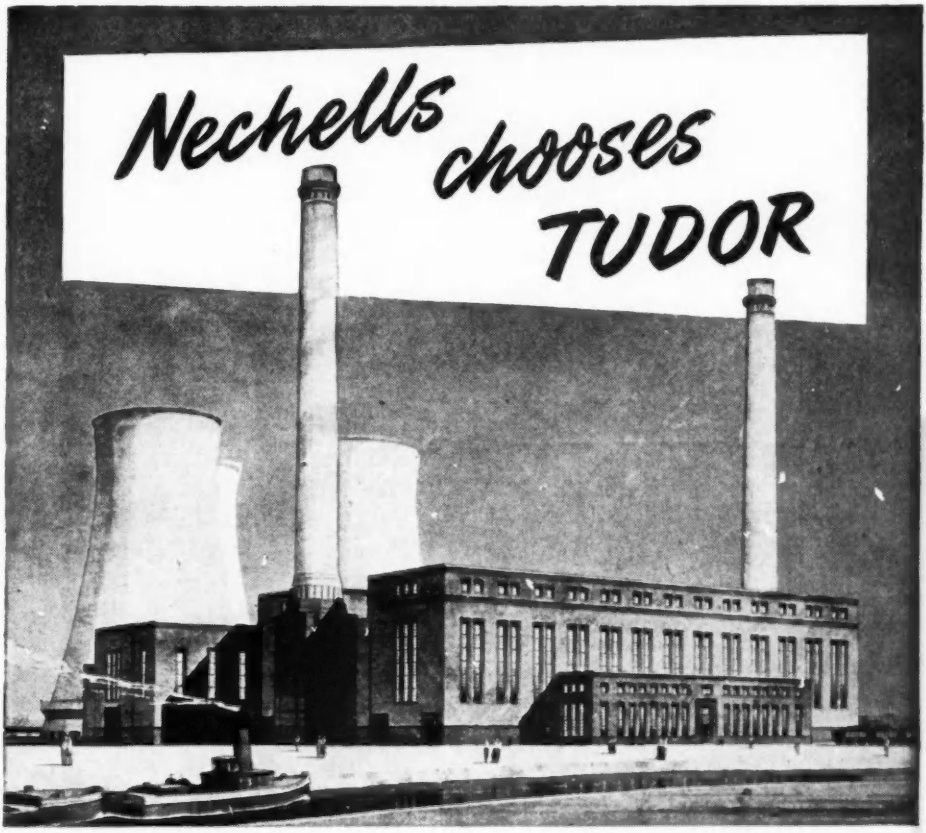

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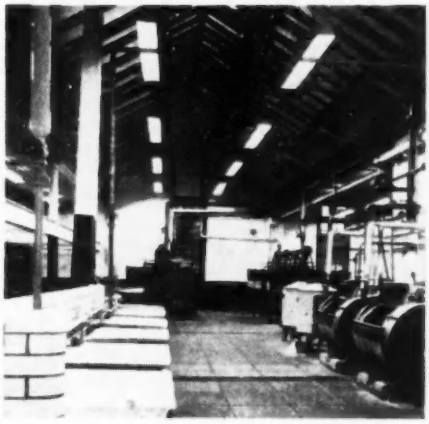

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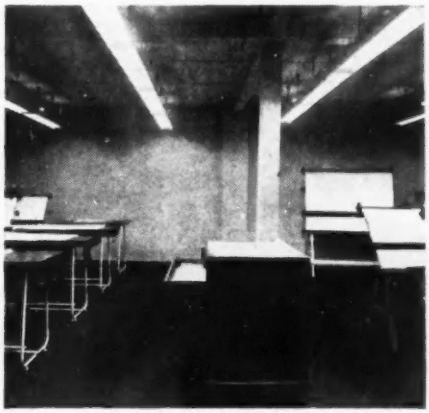

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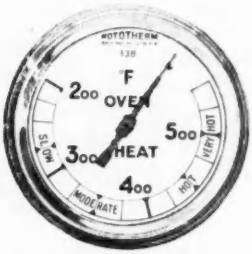

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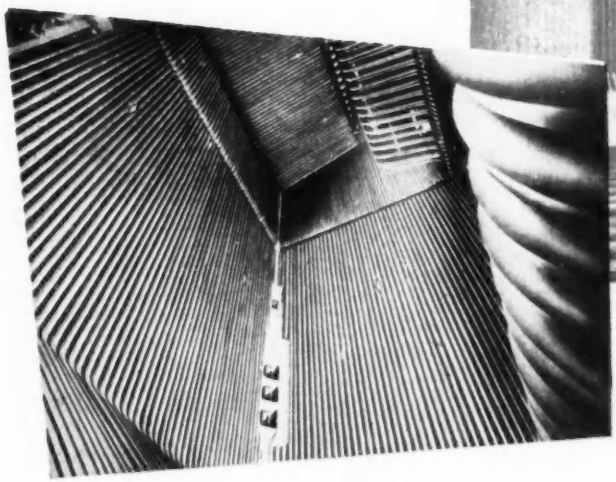

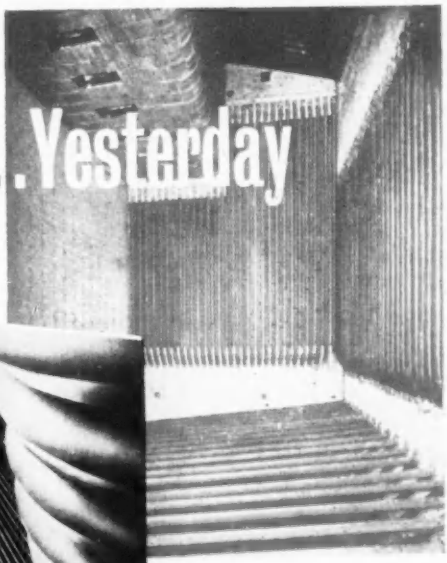

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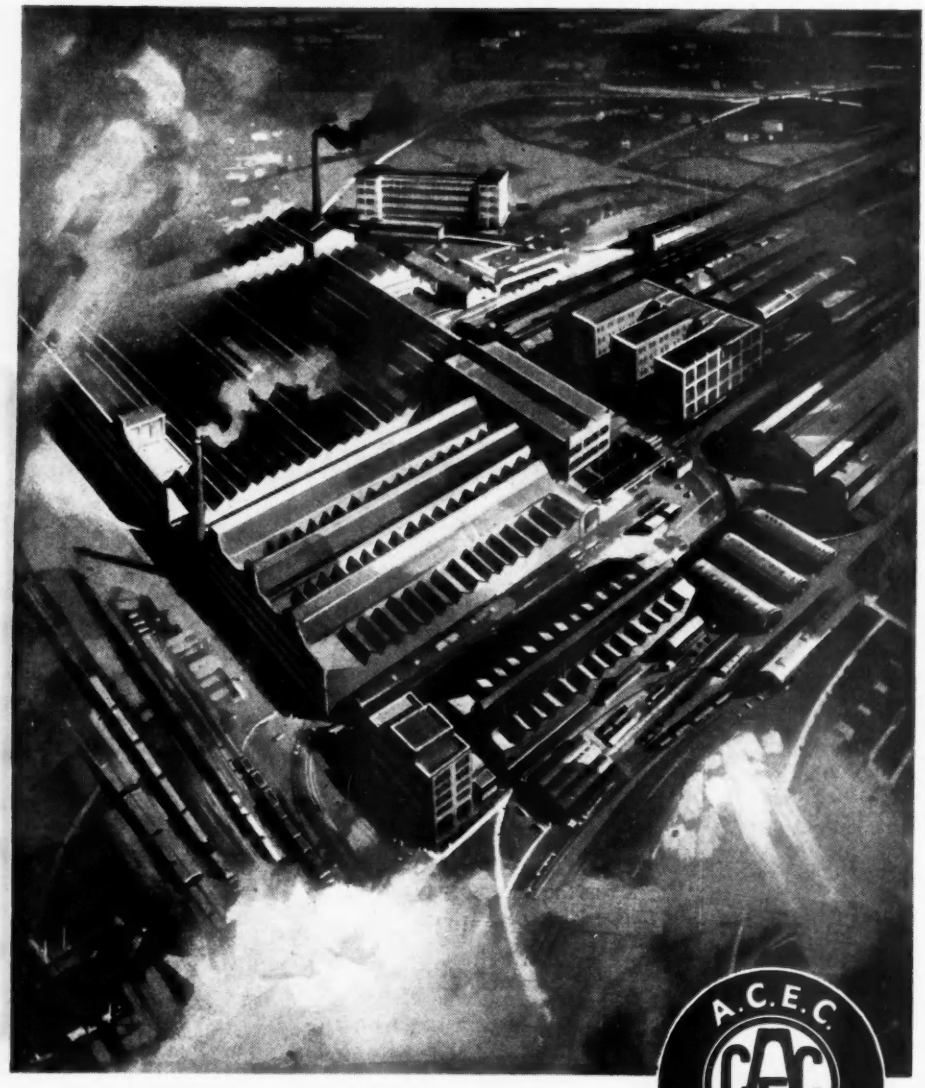

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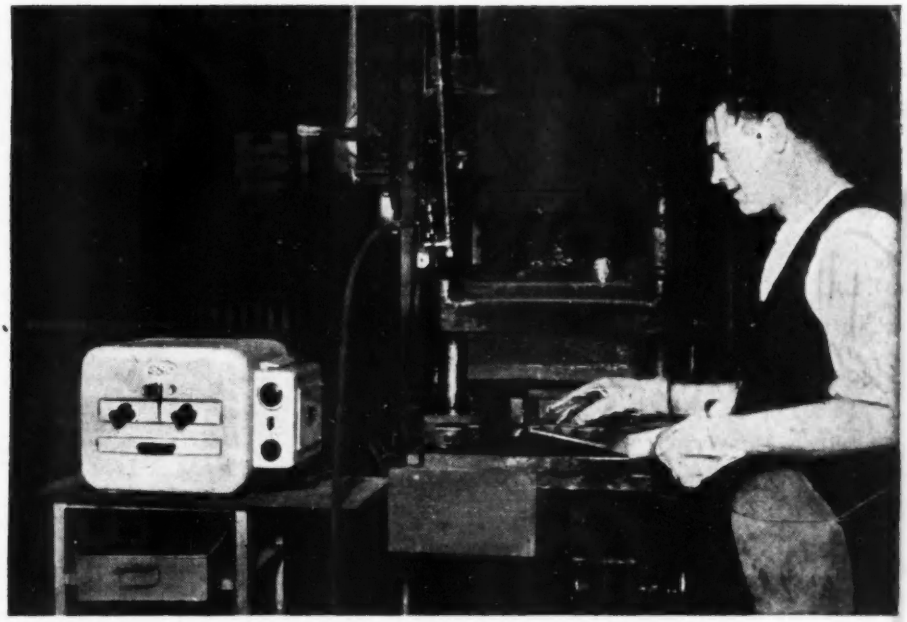

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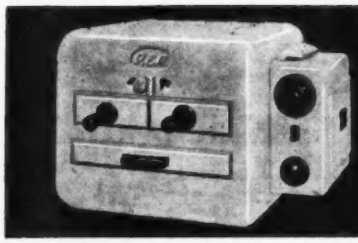

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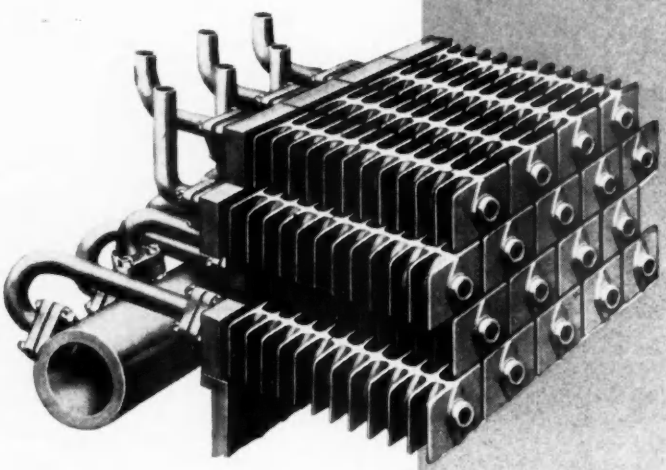

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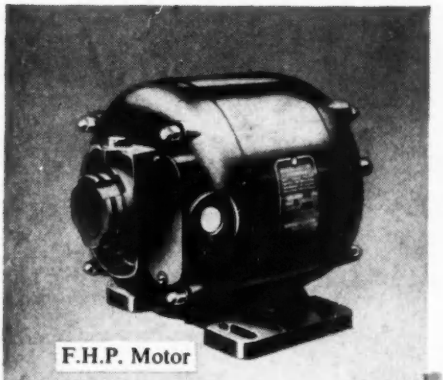

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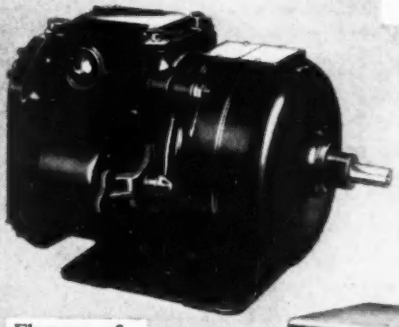

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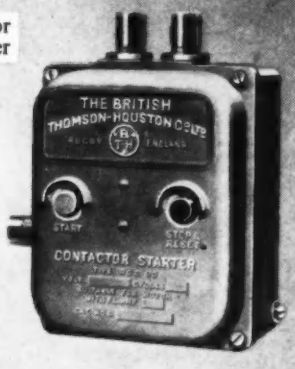

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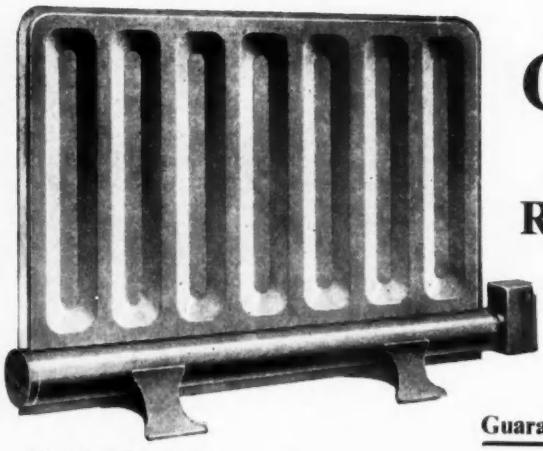

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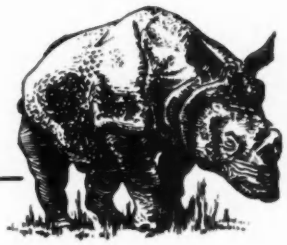

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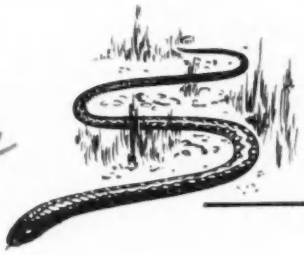

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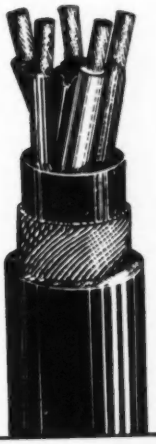

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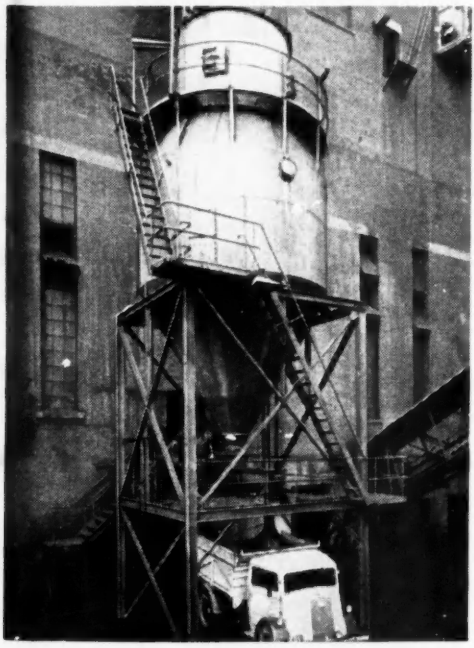

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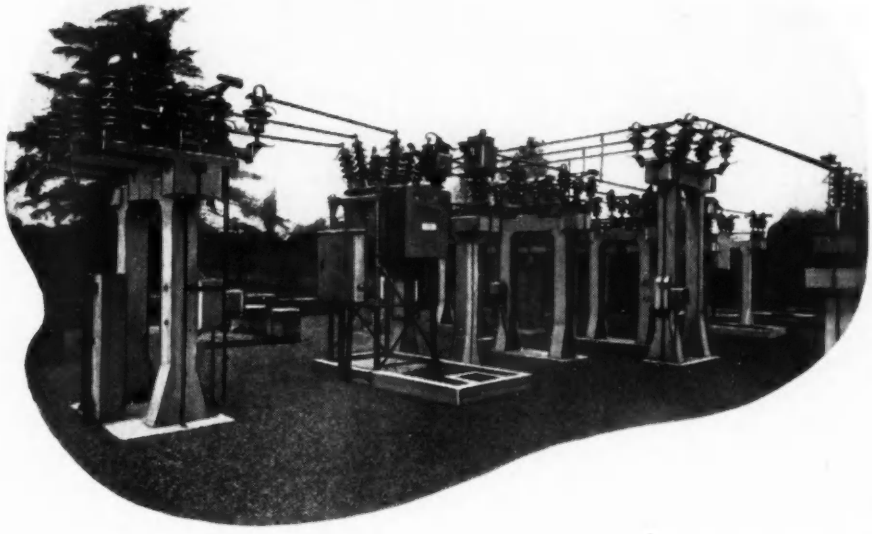

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Higher Rupturing Capacity
35 MVA

For more than two decades the 'English Electric' High Rupturing Capacity Non-Deteriorating Cartridge Fuse Link has established its supremacy on all types of electrical distribution systems.

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Now The English Electric Company announce that the complete range of Type 'T' Cartridge Fuse Links has successfully passed A.S.T.A. certifying tests to BS. 88/1947 Category of Duty 440AC5, i.e. 46,000 R.M.S. Symmetrical Prospective Amperes at 440 Volts, corresponding to a rupturing capacity of 35,000 KVA. (35 MVA.).

This proof of higher rupturing capacity is yet further justification for our claim "Install 'English Electric' and be safe."

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WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

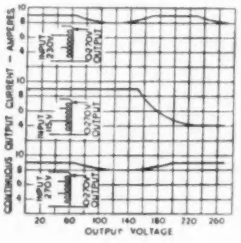
VARIAC voltage-regulating infinitely variable transformer

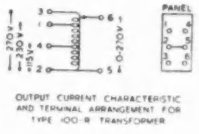
Type	Load Rating	Specifications				No-Load Loss	Net Price
		Input Voltage	Current		Output Voltage		
			Rated	Maximum			£ s. d
100-K	2000 va.	115	15 a.	17.5 a.	0-115	20 watts	17 17 0
100-KM	2000 va.	115	15 a.	17.5 a.	0-115	20 watts	18 12 0
100-L	2000 va.	230/115	8 a.	9 a.	0-230	25 watts	17 17 0
100-LM	2000 va.	230/115	8 a.	9 a.	0-230	25 watts	18 12 0
100-Q	2000 va.	115	15 a.	17.5 a.	0-135	20 watts	18 9 0
100-QM	2000 va.	115	15 a.	17.5 a.	0-135	20 watts	19 4 0
100-R	2000 va.	230/115	8 a.	9 a.	0-270	30 watts	18 9 0
100-RM	2000 va.	230/115	8 a.	9 a.	0-270	30 watts	19 4 0
100-LH	1200 va.	480/240	2 a.	2.5 a.	0-480	25 watts	21 15 0
500-L*	1450 va.	180	8 a.	9 a.	0-180	25 watts	17 17 0
2000-K†	1000 va.	125	8 a.	9 a.	0-125	25 watts	17 17 0

* *for 500 cycles* † *for 2000 cycles service*

SERIES "100" VARIAC TRANSFORMERS

With a VARIAC, voltages are instantly and minutely adjustable from O-Line Voltage. On some patterns, such as 100-R, there is even an "over voltage" feature. This can provide over line voltage, or compensate for low lines. See curves and input and output connections, shown below.





OUTPUT CURRENT CHARACTERISTIC AND TERMINAL ARRANGEMENT FOR TYPE 100-R TRANSFORMER

TYPE 100-R.

● *Many other suggestions on the use of Variac Transformers are contained in Catalogue V549 which will gladly be sent on request.*

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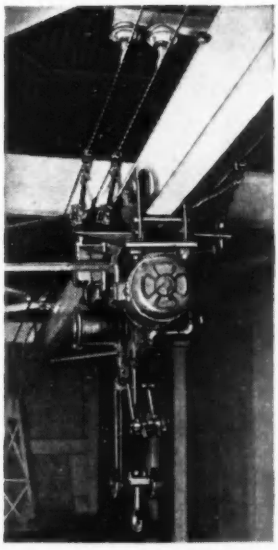
If you need components for current collection equipment, get them direct from BICC — the manufacturers. This Company produces a wide variety of equipment for all types of electrically operated cranes, conveyors, hoists and similar industrial haulage systems.

The range includes conductors, supporting insulators and accessories, and a selection of current collectors. They are obtainable in complete collector units or as individual items.

A small selection of conductor fittings and porcelain-insulated support fittings is illustrated above.

Write today for Publication No. 271 R which gives further details of BICC Current Collection Equipment.



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. . . . is being made towards the day when the new plants of The Steel Company of Wales will be turning out wide sheets and coils **—up to 72" wide.** All sheets coming off the Mills whether hot rolled or cold reduced will be rolled in continuous form, combining high finish with accuracy of gauge.

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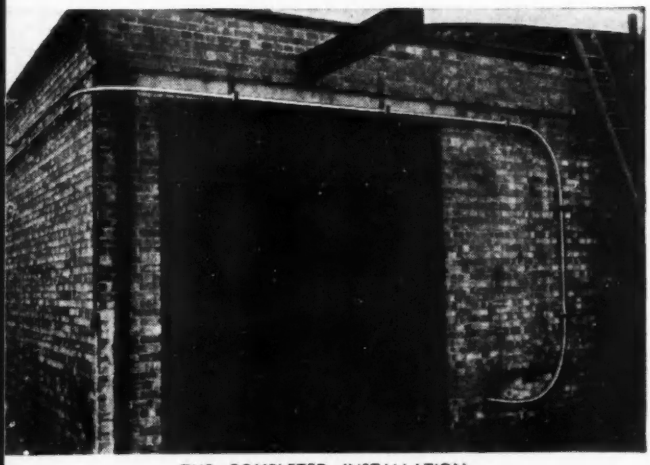

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...ABOVE GROUND

J. & P. Aluminium Sheathed Cables offer very great technical, as well as economic, advantages for surface installations. The strength of the sheath and its resistance to atmospheric corrosion enable cables to be installed bare and unarmoured, and the reduction in weight permits fewer and lighter fixings to be used

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Supporting fittings may be wood (aluminium is immune from attack by wood acids) or porcelain, galvanised iron or aluminium; and, as spacing is not critical, the same support centres can be used for a number of cables of widely differing sizes.

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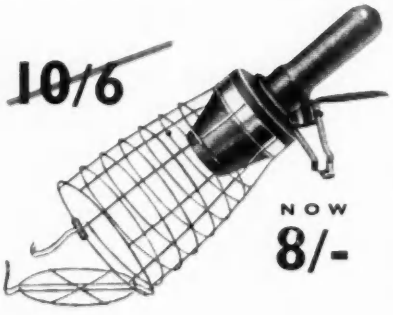

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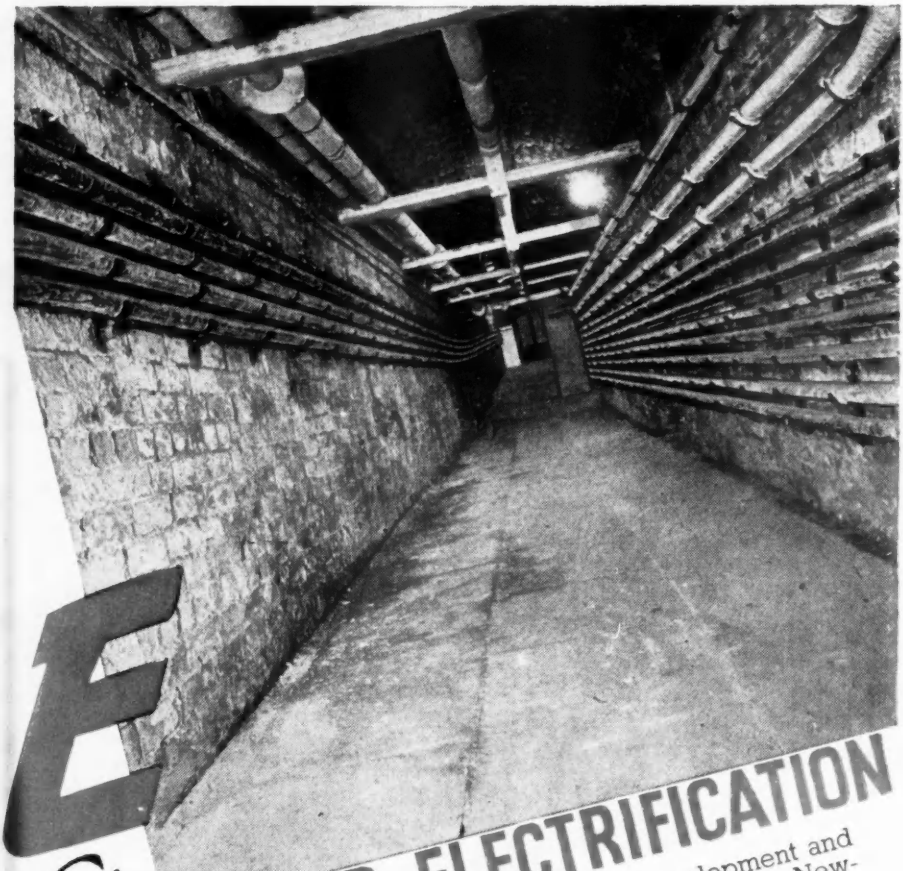

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There are depots of the Design, Development and Contract Department of Enfield at Glasgow, Newcastle, Selby, Cardiff and Portsmouth, all working from a headquarters in London. Each depot is in the care of trained electrical engineers who are fully equipped with men and plant to carry out mains cable installations at any voltage.

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SILVALUX LAMPS

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Still to the fore . . .

WITH TWO NEW SIZES

from MARCH 1st, 1951

Watts	Voltage	Cap.	PRICE EACH	plus Pur. Tax
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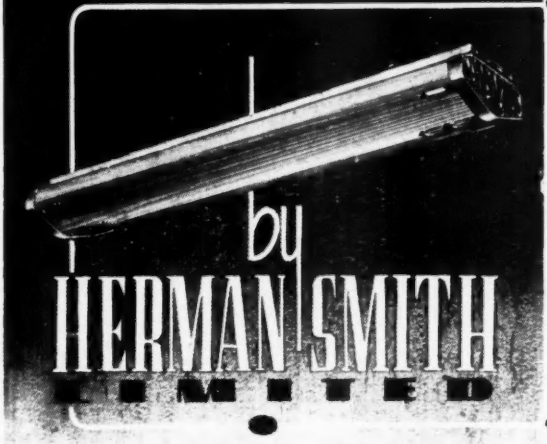

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The K.L.119 is a twin-lamp fitting and may be supplied in a comprehensive range of sizes and alternative types of Diffusers, each of which are precision fitted and are completely dust- and fly-proof.

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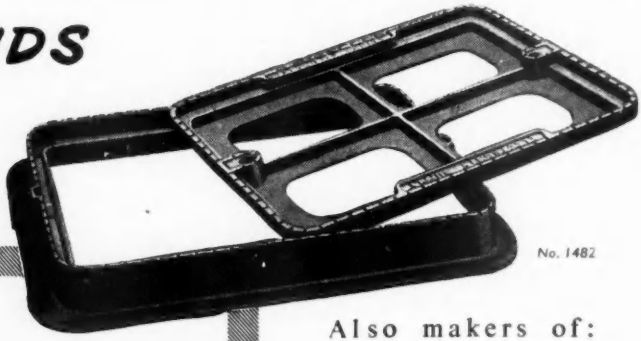

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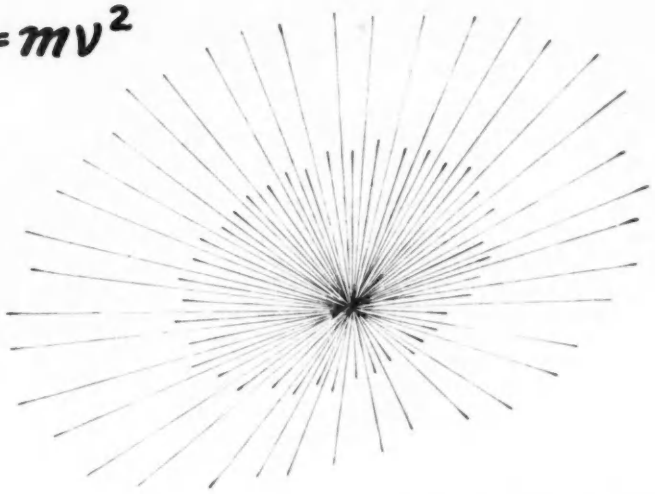

...and the future

It is inevitable that nuclear energy will one day become a normal part of the routine of our lives, its use an every day occurrence, its control as consistently conformable to rule, and as much taken for granted, as electricity is today.

It is obvious that this control will require new forms of insulation, and undoubtedly somewhere in their construction porcelain will play a vital part . . . . . and it is equally obvious that only the finest porcelain will be good enough.

This being so it is certain that the stamp of Taylor Tunnicliff will be as much impressed on the future as it is upon the insulators of modern times.

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THE HORSTMANN GEAR CO. LTD
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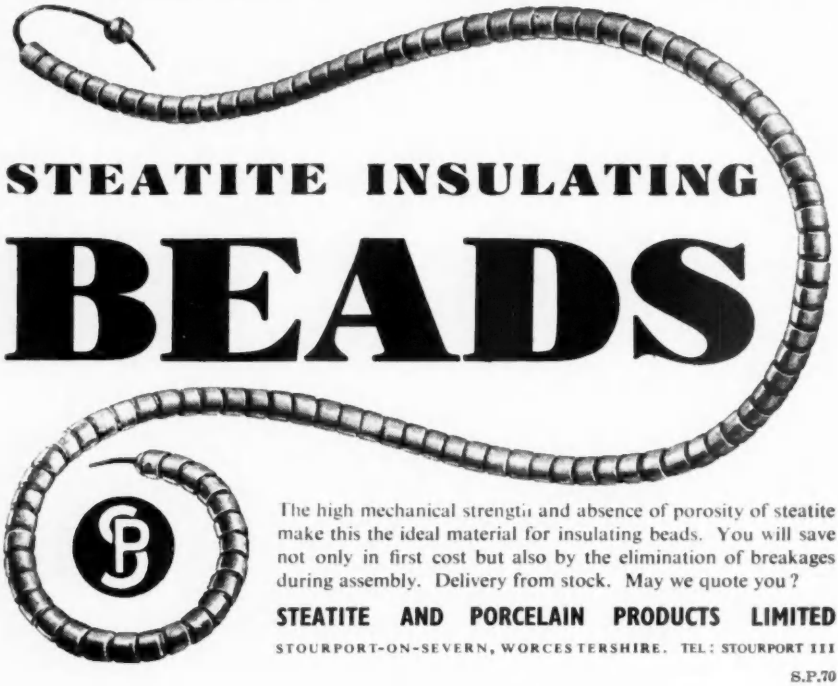

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Power "cuts" for industrial users can be reduced substantially, and their effects on domestic consumers can be minimized. Ripple control achieves this. With its aid, non-essential load can be shed at the touch of a button at any time with comparatively slight inconvenience to the consumer, and with compensatory revenue for the Authority. The capital cost of ripple control is recoverable over a few years, and thereafter the equipment remains as a continuously profitable investment.

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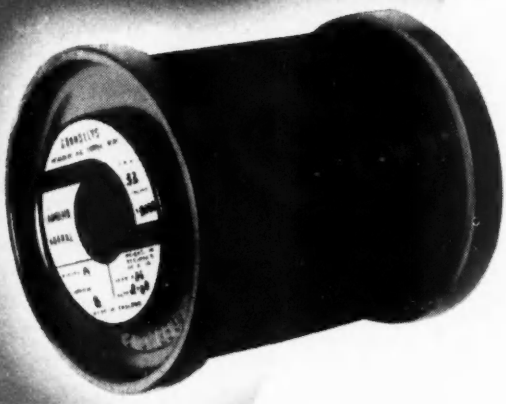

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It is worth while remembering, therefore, that if you have a conversion problem to overcome, it can be solved efficiently and reliably by using

WESTINGHOUSE WESTALITE

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McKechnie

in miniature

The overall diameter of some of these Morganite Potentiometers is just over an inch, so that it is essential for the brass and bronze parts made from McKechnie extruded rod to keep their place and get on with the job quietly. We sell rather more tonnage when a bank has a new grille or when a few more main line expresses are built, but we are just as proud of the big things that are done in small compass. Microscope Makers and Marine Engineers, please note.

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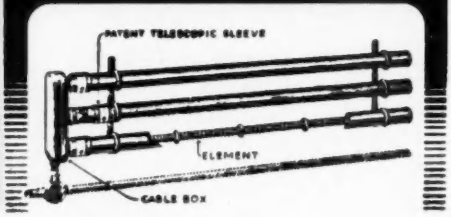

For Heavy Duty and Long Life-
WITH THE PATENT TELESCOPIC SLEEVE TO ALLOW EASY ACCESS FOR WIRING

The ARORA Company ROSEBERY STREET, LOUGHBOROUGH
Specialists for over 30 years

SINGLE POLE AND NEUTRAL GEAR
by
SANDERS
WEDNESBURY

METAL CLAD SWITCH FUSE FOR CONDUIT ENTRY. 15 AMP. FUSE
LIST NO. N.101 RC.
CONSOLIDATED LIST PRICE : 10/6 EACH

BRITISH ELECTRICITY AUTHORITY

Pursuant to Section 37(1) of the Electricity Act, 1947, the following tariff for the supply of electricity by the Central Authority to Area Boards has been fixed and will come into operation on the 1st April, 1951.

TARIFF

Electricity will be supplied at this Tariff during each year of account to the Area Board at the points of supply at which electricity was being supplied to the Board by the Central Authority at the commencement of the year of account or at such points as may be agreed between the Central Authority and the Area Board.

The price to be paid for electricity so supplied in each year of account shall be the sum of the charges set out in paragraphs (A) and (B) hereunder:

(A) Fixed Kilowatt Charge

For each kilowatt of simultaneous maximum demand on the Central Authority the sum of £4 2s. 6d. (four pounds two shillings and sixpence).

For the purpose of ascertaining the amount of the fixed kilowatt charge "simultaneous maximum demand on the Central Authority" means in respect of each year of account the sum of:

(i) Twice the largest number of kilowatt-hours supplied by the Central Authority to the Area Board during any half-hour between 7 a.m. and 7 p.m. on any Monday, Tuesday, Wednesday, Thursday or Friday or between 7 a.m. and 12 noon on any Saturday in the year of account, and

(ii) one-third of the number of kilowatt-hours (if any) by which twice the largest number of kilowatt-hours supplied by the Central Authority to the Area Board during any half-hour as aforesaid, is exceeded by twice the largest number of kilowatt-hours so supplied during any other half-hour during the year of account.

(B) Running Charge

For each kilowatt-hour supplied by the Central Authority to the Area Board during the year of account the sum of 0.33d. (decimal three three of a penny).

Variation of the Running Charge

The running charge shall be increased or reduced by 0.0007d. (decimal nought nought nought seven of a penny) for each penny (a halfpenny or any greater part of a penny being treated as a penny) by which the fuel cost per ton in the year of account shall be above or below 38s. (thirty-eight shillings).

For the purpose of this variation:

(a) *Fuel cost per ton* in any period shall be determined as follows:

The total cost of fuel consumed in the period at all the Central Authority's stations in the Area of the Area Board taking the supply shall be divided by the total number of tons of fuel so consumed and the cost per ton so obtained shall be multiplied by 11,000 and divided by the average gross thermal value of the fuel so consumed expressed in British Thermal Units per lb.

(b) "*Cost of fuel consumed*" shall mean the sums expended for fuel consumed plus the cost of any transport, handling, preparation or treatment incurred in connection with the delivery of the fuel to boiler hoppers or furnaces and in connection with the disposal of the products or residues of combustion, together with the proper proportion of salaries and wages, and any contributions for pensions, superannuation and insurance of officers and servants attributable thereto, less any sums received from the sale of any products or residues of combustion.

March, 1951.

H. F. CARPENTER,
Secretary.

British Electricity Authority,
British Electricity House,
Great Portland Street, London W.1.

STREET LIGHTING CONTROL

TAKE CARE OF THOSE SWITCHING "Surges!"

Photograph by permission of **The General** *Electric Co. Ltd.*

Venner Time Switches are daily saving thousands of man hours. Suitable for single or group control of street lighting and island bollards, these robust mechanisms will give many years of trouble-free service and rapidly repay their initial cost by an all-round saving in labour, time and power consumption.

Half night Control
FOR FLUORESCENT STREET LIGHTING

Standard switches may incorporate solar dials, manual operating devices and hand wound, synchronous motor driven or in case of power-cut problems synchronous motor with spring reserve clocks as desired.
In addition to normal dusk and dawn switching, "half-night" control of modern multi-tube fluorescent lighting units is readily effected by the Venner Time Switch Type MSDC, which includes a solar dial and the requisite double-circuit control to allow one or more tubes in a unit to be cut out at a pre-determined hour, usually between 11 p.m. and 1 a.m. Models may be supplied with hand wound or synchronous motor driven clocks as desired. Also available for double-pole applications.

Write for LEAFLETS TS 21 and 25/ET

We also specialise in Process Timers, Programme Ringers, Stop Watches, Hour Recording Meters, Prepayment and House Service Meters, Delay Relays and Master Pendulum Clocks.

There is a VENNER Time Switch for every purpose!

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ELECTRICAL TIMES

Vol. 119 No. 3095 THURSDAY, 1 MARCH, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

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SUBSCRIPTION RATES.—United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$5 50c., U.S.A. $5 50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

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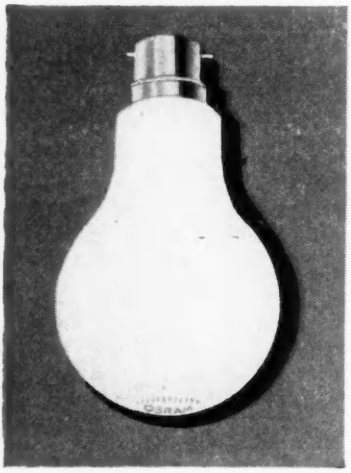

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THE GENERAL ELECTRIC COMPANY, LIMITED, MAGNET HOUSE, KINGSWAY, LONDON, W.C.1

Editorial

THE TOOLS OF REARMAMENT

IT is fully recognised that the rearmament programme will bring a substantial increased demand for electrical energy. At first this will be scarcely discernible; indeed, there may even be a reduction in industrial demand. But as retooling is completed, new factories come into operation, and our machine tool production supplemented by Government purchases abroad, the industrial load will soar. Unfortunately, the supply industry has not recovered its equilibrium after the last war and is hardly in a position to face the worst of two worlds: increased arms production without the wartime restrictions of electricity usage. The first step to balance accounts must be to simplify procedure. If the country is to be geared to a wartime economy, there is no room for the restrictions which beset us. What is needed is prime ministerial priority to cut through the local limitations and planning procedure which go to the building of a power station. But this will not create new equipment so the time is opportune for another approach to the Government to permit purchasing abroad. Failing success in this, a more urgent top-level chasing of plant is the only course open. Above all, we should take a leaf out of the American book and appoint a single man as director of plant construction. He must be of a character to get results, with overriding authority to cut through the tangle of red tape and short circuit the perennial committees. Such power is beyond the B.E.A.'s to grant, but if they cannot persuade the Government to take such a step, an appointment to operate within the walls at British Electricity House should at least go some way along this necessary path.

ENGINEERS WANTED

ONLY nine engineering graduates are being trained in Great Britain where ten are needed. That is the official estimate, and we were concerned to hear SIR ARCHIBALD GILL, speaking at the I.E.E. annual dinner, suggest that the ratio was in fact less favourable still. Graduates and professional engineers do not stand alone; they need the other ranks of the industry to give effect to their work, and it is the whole system of technical education that needs stepping up, as we have often suggested. A move in the right direction is the upward revision of the Burnham salary scales for technical teachers, especially since more freedom to provide attractive remuneration is suggested for the classification of heads of departments. Add to this the possibility of more teachers, with better accommodation, then the desired increase in trained engineers will soon begin to appear. That unfortunate suggestion, the Royal College of Technologists, will become even more superfluous, and it is significant to the general feeling towards it that Sir Archibald, in words of unusual solemnity, described as "very difficult" the situation that might arise if the Minister of Education endorsed this plan. Practical steps, such as salary increases, are more likely to be efficacious than the forcing of an untested organisation on our unwilling industry.

COSTLY RINGS

THE £1,000 house competition arranged by "The Builder" displays an intensive application of architectural ingenuity. Unfortunately, some of the designs submitted showed evidence of poor or even inaccurate knowledge so far as the electrical installations were concerned. Perhaps the most common errors were in connection with the ring main, frequently specified with the confident description of "standard." Undoubtedly the main advantage of the ring main system is that it permits the supply of an unlimited number of socket-outlets in a small house, with only one fuse to protect the sub-circuit. Despite this, most of the architects who specified the ring main worked on the basis—one room: one power point. Furthermore, on this plan, five was

the usual number of socket-outlets required, and the ring main is hardly likely to be an economical solution for such an installation. Advantage could more properly be taken of the provision in the I.E.E. wiring regulations, which permit up to six 13-amp socket-outlets being connected in a final sub-circuit when a 30-amp fuse and a 7/·036 in. conductor is used. One wonders what happens when such specifications go to the electrical contractor for quotation. Does he point out that they are uneconomic or meekly decide that the architect knows what he wants?

POPULAR MATHEMATICS

IT is seldom indeed that highly mathematical papers receive close attention and appreciative discussion from practical power engineers. The reception accorded to the paper "The Transient Theory of Synchronous Generators," which Mr. ADKINS read at the I.E.E. last week, proved an exception to this rule. As such it deserves closer inspection than such works usually receive. The first of its many qualities lies in engineering history: it represents a successful British attempt to enter for the first time for some thirty years a branch of engineering studies in which the notable modern work has been almost exclusively American. Moreover—and herein lies the second justification for the welcome accorded to the paper—the end product of the mathematics has a direct application. It is a clear picture of what is implied in many of the simplifications made in machine representation for the purpose of system studies and for the calculation of current peaks for switchgear investigations. Finally, Mr. Adkins achieved good timing for his paper. There is growing interest amongst the technical teachers in our engineering colleges in the behaviour of machines under changing conditions, and a noticeable trend towards a "new look" in the study of electrical machines. More attention to the transient condition and less exhaustive study of steady state working seems probable, and this paper will prove a very useful introduction for such work.

B.E.A. NOMENCLATURE

WHAT is the British Electricity Authority? Meteor has been trying this question on a few friends and surprisingly only about 60% gave the right answer. For our information we must go to the Act, wherein it is clearly stated that the B.E.A. is in fact the Central Authority, that august body of Portland Place. Thus the Area Boards are in no way part of the British Electricity Authority, but lest those fourteen Boards should feel left out in the cold, Meteor would hasten to point out that the Central Authority also ranks as an ordinary member of the team by classifying it as one of the sixteen "Electricity Boards." The real confusion in nomenclature has arisen from the need for an overall title for the nationalised supply industry, including the Area Boards, and it is becoming a common practice to make use of the words "British Electricity Authority" for this purpose, thereby purloining one of the duplicate titles of the Central Authority whom, we feel sure, will raise no objection to such a use.

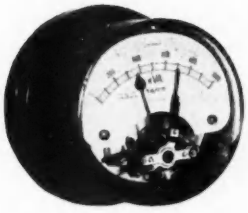
TECHNOLOGY WITHOUT TEARS

ANY engineer who has experience of lecturing will agree that it is far easier to address an audience of third- or fourth-year students than to explain the first principles of electricity and magnetism to those utterly ignorant of them. It is given to few of us to present fundamental knowledge without ambiguity, misunderstanding or boredom, and there is a distinct tendency for the discourse to drift from the turbid to the incomprehensible. The educational films produced by E.D.A., the fourth series of which is reviewed elsewhere in this issue, were expressly designed to save us from pitfalls of this type, and some idea of the way in which they perform this task may be gauged from the fact that E.D.A. have already sold more than a thousand copies in this series, in addition to more than seven times that number of bookings for loan films. E.D.A. refer to this as "an experiment that succeeded." As a piece of understatement that takes some beating.

Meteor

The Distant Indication of Alternating Currents

By R. J. REDDING, A.M.I.E.E.



Alarm relay designed by Elliott Bros.

MANY systems are available for the remote indication of an a.c. quantity at some distant location. Such systems have as their important component a transmitter, usually a measuring element producing a torque or deflection which in turn is used to control the magnitude of a current in some auxiliary circuit. This current, which operates the remote receivers via pilot wires, is usually a small continuous direct current.

However, in some a.c. measurements, particularly for current and voltage measurements, a suitable current for operating indicators at a distant location can be obtained directly from the quantity concerned without the elaboration of a transmitter. The term "distant" indication is applied to such an arrangement as opposed to "remote" indication using a separate transmitter and power supply.

The simplest case is the extension of connections to current and voltage instrument transformers for, perhaps, 100 yds, but this is seldom good practice for several reasons. Firstly, the cable section must be generous to minimise the VA loading and secondly, dangerous conditions arise if the pilot wire circuit becomes faulty. Here it is worth repeating the basic rule for instrument transformers—that a current transformer secondary must never be open-circuited (or a voltage transformer short-circuited).

If the output of a current transformer is reduced to small value, say 10 mA, by an auxiliary current transformer, the power wasted in the lines is very much reduced and the safety is enhanced. However, a.c. indicating meters of the dynamometer or moving-iron type become very inefficient at low current values. Consequently, it is necessary to rectify the transformer output. Provided the wave-shape is not badly distorted, this results in a number of advantages. A wide range of standard moving-coil indicators and recorders may be used, and since the pilot wires carry d.c., inductive pick-up and interference is eliminated.

A versatile unit known as a rectifier transmission unit is manufactured by Elliott Brothers and the circuit for operation from current transformers is shown on Fig. 1. The input winding of the auxiliary transformer can be split into a number of sections to enable the summation of a number of feeders if desired. The smoothed d.c. output of 10 V 10 mA enables the use of a simple pilot-wire circuit of resistance up to 1,000 ohms.

The current transformer action still persists in the pilot circuit, i.e. if the circuit resistance rises the voltage output will rise in an endeavour to maintain the magnitude of the current. This effect compensates for temperature/resistance change in the pilot circuit. However, the voltage can reach a dangerously high value should the pilot circuit be broken. A neon lamp is therefore included across an additional winding which strikes and loads the transformer should the voltage tend to rise beyond the capacity of the rectifier. The load taken by the unit is very small, its actual value being usually less than 1 VA.

The circuit for voltage operation is similar, but in this case it is short-circuit which is dangerous. Fuses are therefore used for protection instead of the neon circuit.

Power Demand Alarms

A typical use lies in the remote supervision of the load on some item of plant, such as a motor, furnace or transformer. In addition to indication and recording, an alarm device is often required to give a warning if the current rises above a certain value.

The alarm relay for this purpose (above) is a robust moving-coil indicator with an index pointer carrying a contact which can be set to any desired value by reference to the scale, the moving contact being carried by the pointer. Such contacts are suitable for a small load only and an auxiliary relay is required to handle sufficient power for a bell, klaxon or circuit breaker. The relay has a short time delay feature to avoid alarms on surges of short duration, and the circuit of a unit complete with signal lamps and a switch for silencing the audible alarm is shown in Fig. 2.

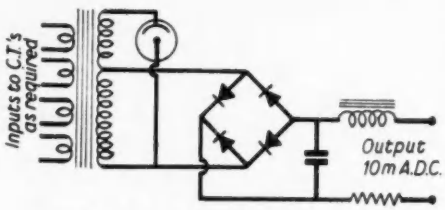


Fig. 1. Circuit of rectifier transmission unit

Such a set of equipment is a useful adjunct to the limiting of maximum demand to avoid tariff penalties. The indicating ammeter can be conveniently scaled in kVA at an assumed voltage. The bias of any error resulting will be on the safe side since, at heavy demand, the voltage is invariably low. The arrangement provides a continuous distant supervision of the load in kVA, and an alarm when the demand is such that, if maintained for more than a few minutes, a penalty would be incurred.

It should be emphasised that the indication is the *instantaneous* demand—not the average demand over a period of time. The latter requires more costly integrating meters for which distant indication means complex extra impulse devices, and with which the load can only be ascertained at certain instants.

Summation Metering

When summation of a number of loads at separate locations is required, e.g. a factory with several substations, the coil of the indicator can be split into sections each operated by a rectifier unit. Alternatively, the equipment can be combined with a private telephone system to give a selected indication when required. In this case, full use is made of the output circuit characteristics; the output voltage is limited to a safe figure when the unit is not in use, and the indicating current is independent of quite large changes in the circuit resistance, and hence different routing and the resistance of selector switches is of small moment.

When the auxiliary transformer has a number of inputs for the summation of a number of three-phase feeders, these inputs must, of course, be connected to the same phase of each feeder. If however, three inputs are connected to the three phases of one feeder, an output results only if there is unbalance between the phases. This arrangement has uses in the detection of the occurrence of unbalance, which

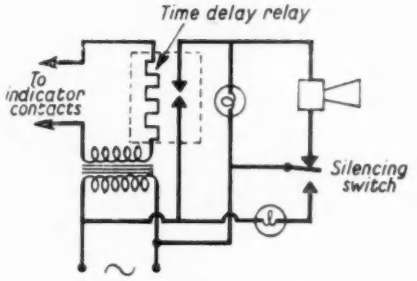


Fig. 2. Alarm relay unit

in some cases, such as an electric furnace, indicates an impending breakdown. In a four-wire system, the neutral line may be metered for this purpose.

The principle of this rectifier unit is quite useful in the solution of some instrument problems even when a distance feature is not involved, e.g. when indicators of unusual size are demanded. Suitable d.c. milliammeters are available in sizes from 2 in. for panels to 45 in. for observation throughout a large building. A similar use occurs when a multi-way recorder is required to graph temperatures and power input to a furnace on one chart. Temperature measurement demands a d.c. recorder and the rectifier unit gives a suitable output for such a recorder.

The scheme could also be applied to hazardous areas where "flameproof" equipment is normally necessary. Flameproofing demands that equipment shall have enclosures which can withstand an internal explosion without transmitting it to the surrounding atmosphere. An alternative for measurements is "intrinsic safety," in which the measuring current is kept to such

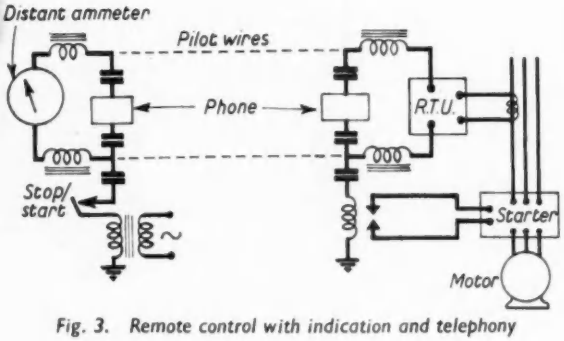


Fig. 3. Remote control with indication and telephony

a small value that any sparking is unable to cause an explosion, and hence elaborate enclosures may be avoided.

Remote Control Circuits

As with all remote indication circuits using a small d.c. quantity in the pilot circuit, alternating-current signalling (including telephony) can be superimposed on the same pilot circuits without interference with the indication.

Fig. 3 shows a circuit for a motor pumping set giving indication of current taken, remote manual control, and telephony between the two locations on one pair of pilot wires. The pilot loop is used for indication with magneto-ringing telephones in parallel via condensers, which prevent a d.c. shunt path. Chokes are inserted to restrain the alternating current from the indicator and rectifier transmission unit. A 50 c/s a.c. signal between one line and earth operates the relay for starting and stopping the motor.

Multiple Conductors in Britain

Preliminary values for corona loss, charging current and radio interference obtained in Leatherhead experiments

PRELIMINARY results obtained on the B.E.A. experimental 275 kV double conductor line at Leatherhead were quoted during the discussion of Mr. E. J. Holmes's I.E.E. London Students' Section paper last week (ELECTRICAL TIMES, February 22, p. 302). It was stated that prolonged tests in all types of weather had shown the fair weather corona loss to be about 3 kW/mile, with a mean value throughout the tests of approximately 5 kW/mile. For the purpose of the tests, twin s.c.a. conductors of 0·77 in. diameter (0·175 sq in. equivalent copper conductor) were strung at a spacing of 12 in. between the two conductors of a given phase. The horizontal spacing between phases was 32 ft 6 in. The corresponding losses for single 1·25 in. diameter conductors were expected to be of the same order. Charging current for a double conductor line will be 0·9 amp/mile at 275 kV, compared with 0·35 amp/mile for a normal 132 kV Grid line.

Radio Interference

One of the problems associated with the operation of very high voltage lines is that of radio interference occasioned by discharges from the conductor surface. Tests on the Leatherhead experimental line had shown that a television receiver could be operated within ten yards of the installation, picking up signals from Alexandra Palace, some twenty miles away, with negligible interference trouble.

Dr. J. S. Forrest, D.Sc., F.Inst.P., M.I.E.E. (Director of the Research Laboratories, B.E.A.), who was present as senior member at the meeting, emphasised that the measurement of losses on the line is a matter of great difficulty. It was intended to check the figures given by various independent methods, and until this work had been carried out they should be treated with reserve. Tests on a 12 in. conductor spacing had largely been completed, and further results would now be sought with smaller spacings and also with an equivalent single conductor.

Disadvantages in England

The paper had concentrated largely on the arguments in favour of double conductors and on the experience of overseas installations. Considering the position in this country, Dr. Forrest emphasised that many engineers were concerned about the possible results of heavy ice loading, which might be more severe for a double conductor line than for its single conductor equivalent. In many countries the higher capacitive reactance and lower inductive reactance of the multiple conductor line was an advantage, especially when long-distance bulk transmission was involved. In this country, with comparatively short lines, the advantage of a low inductive reactance was not so pronounced.

Looked at from this angle, the matter of multiple conductors depended on overall system design. He was inclined to think that at 220 kV a single conductor should be used; 300 kV provided a borderline case, with distance of transmission the determining factor. Above this voltage—say at 380 kV—the double conductor was preferable. Mechanical consideration ruled out the use of more than two conductors per phase.

The American Gas and Electric Company, faced with a problem similar to the British one of providing a higher-voltage "backbone" for their system, were considering the use of 300/330 kV as a transmission voltage with single conductors for the lines.

THE I.E.E. DINNER

The President Reviews the Activities of the Institution

THE responsibility carried by the I.E.E. was more than the toughest would care to contemplate, said PROFESSOR E. D. ADRIAN, O.M., the President of the Royal Society, in proposing the toast of "The Institution of Electrical Engineers" at the annual dinner last Thursday.

The original foundation, the Society of Telegraph Engineers, had, he said, been of an importance as revolutionary as the invention of the printing press, and had succeeded in bringing the inhabitants of the globe closer together—even if it had not made them greater friends.

Technical Progress

The change of title to the Institution of Electrical Engineers had ushered in the all-electric age, with such innovations as the Twopenny Tube and the arc-lamp, which flickered just as well as did many of the most modern productions. We were now firmly committed to the electrical age, and in its progress it was producing new marvels every day. Everyone who worked in a laboratory could now obtain a machine which would halve his labours—if only he could afford it and find out how it worked!

In more serious vein, he pointed out the assistance which the intensive study of electronics was affording to increase the knowledge of the workings of the human brain, and the possibilities of obtaining machines to supplement or supplant the brain. A world peopled by contented machines would have much to recommend it. This, of course, had been the theme of many books and prophecies, but it was a comforting fact that predictions of this type were almost always wrong. The human brain always scored in the end.

Replying, SIR ARCHIBALD GILL, B.SC.(ENG.) (President, I.E.E.) said that the I.E.E. at barely 80 years of age felt embarrassingly young when it considered the 300 years of the Royal Society. An interesting link between the two was that of 68 past presidents, 23 had been Fellows of the Royal Society.

I.E.E. Growth

Commenting upon the proposed Science Centre, which was to afford the more important learned societies with more suitable accommodation, Sir Archibald said that the Institution had its own accommodation problems. When the present premises were acquired, the total membership was about 6,000. It was a tribute to the foresight of our predecessors that the accommodation then provided had permitted a growth to 37,000, with vastly increased activities. While the I.E.E. did not envy the Royal Society its Governmental patronage, it was under no illusion that its own problems could be solved in such a simple manner, and the Council was studying the situation so that some action could be initiated—it was obvious that the present building could not serve till the expiry of the lease (1984) with an intake of approximately 1,500 members per year.

The work of the Institution had been growing even more rapidly than its membership, and expenditure had now caught up with income, so that it was necessary to envisage some restriction in activities in order to avoid increased subscriptions. Funds spent wisely on the Institution objects—the general advancement of electrical science and the facilitation of the exchange of information—would bring in a better return than any other form of investment. With the vital part played by electrical exports in the life of the country, it was hardly necessary to emphasise the importance of the Institution's work; it was vital that the knowledge and ability of our engineers should be at least as competent as those of other countries.

Education

On the educational policy of the Institution, he pointed out that in spite of the fact that the supply of graduate engineers was officially estimated to be 10% less than the demand, the Council remained convinced that the high standards set for corporate membership must be maintained, or even improved. While he welcomed the attention which had been given to education, the proposals of the National Advisory Council on Education for Industry could only be supported by the I.E.E. and other professional bodies if they were considerably modified, and he trusted that the proposals made to the Minister would be carefully considered if a difficult situation were to be avoided. Possibly even more important, however, was the shortage of technicians. The reception given to the I.E.E. report on their training was gratifying, but the problem was being further studied.

Sir Archibald concluded by referring to the close collaboration between the three senior engineering institutions and its fruition in the establishment of the Conference of Commonwealth Engineering Institutions and the conference of representatives from the engineering societies of Western Europe and the U.S.A.

The toast of "Our Guests" was proposed by PROFESSOR E. B. MOULLIN, M.A., SC.D. (Immediate Past-President), under three headings: "Those who pray for us, those who fight for us, and those who work for us. . . ." Response was made jointly by MR. HUGH LYON, M.C., M.A. (Director, Public Schools Appointments Bureau), and SIR HENRY SELF, K.C.B., K.C.M.G., K.B.E. (Deputy Chairman, B.E.A.).

Our readers' views . . .

Aluminium Windings

I CAN confirm Mr. Kennett's remarks on the above in your issue dated 15th instant. Aluminium windings in transformers are no new departure, although they may in the past have been so wound from necessity rather than for any special design considerations. I heard recently of a large oil filled transformer in the Channel Islands, which had been brought there by the Germans during their occupation during the war, and which on examination, was found to have aluminium windings. My concern was whether it could, in the event of a winding breakdown be rewound in England with aluminium conductors. I was, however, assured that copper could and would be used without any difficulty arising.

It is not clear why the Canadian G.E.C. are using aluminium instead of copper and I can only assume that the customers have made the stipulation.

H. J. Long

CHEAM, SURREY

• • •

Training the Technician

SOME time ago an interesting letter appeared in your columns from an electrical fitter, with the National Certificate who complained that his manual post counted against him when applying for a technical post.

The Ministry of Supply recently invited journalists to visit factories and see apprentice training schemes in operation following upon a paper on that subject delivered before the Institution of Mechanical Engineers. Their report was enlightening, and to the effect that: "While there is a pool of embryo technicians, there are not enough craft apprentices to go round." Our friend is obviously trying to crash into a grade fast reaching saturation. Employers will then demand qualifications higher than he has, and prefer the pure technician.

Meanwhile there is a growing shortage of skilled craftsmen, The Sheffield Employment Committee were told recently that the City has 3,300 vacancies for skilled craftsmen, Coventry has 2,500, and other towns in proportion. A position which caused Mr. J. Loxham to survey the position and read a paper on "Training for Craftsmen" before the Institution of Mechanical Engineers.

This paper puts down the growing shortage to various causes, insufficient difference between skilled and unskilled earnings; the erroneous belief that when a person works with his hands and certain mechanical aids he is not using his brains; the belief that all office work demands more brains that factory work; the transfer of all forms of production planning from the factory floor to the works office; the lack of any guilds, institutions, or associations, where membership is restricted to persons of proved high qualifications.

All, or some of these, are the reasons why our friend wishes to leave his skilled craft, and which will cause many others to take similar action. It already causes headmasters to recommend clerical work rather than to train for a craft.

If this position persists, within a few years our industry will be as short of manual workers as the pits are today, and shorter still of new entrants. What steps are being taken to alter this?

In the "Institution of Mechanics" a craft guild does exist, as one journalist pointed out, catering for persons of proved high-class qualifications, but that alone will not suffice. Much will be done by offering craftsmen membership of their own professional organisation, but it needs backing up by a better status for existing craftsmen.

Machinery is getting more complicated, craft skill needs to be higher than before, training of apprentices needs to be longer. There is every reason to consider that the skill required, the training needed, merits the best craftsmen to be raised to at least clerical status. In the past it has been usual to employ craftsmen trained in contractors works, they are already suffering a shortage of apprentices and will offer more inducement to remain.

Are we then, going to let our industry get into the position of the pits before we consider taking any action? Public patience will be exhausted by then and scapegoats will be demanded.

John Bowler

LONDON, S.E.16

VICTORIA'S PLUMS

Commission's power and fuel plans nearing fruition

BESET with fuel troubles in addition to a shortage of generating plant, the State Electricity Commission of Victoria, Australia, has again had to impose restrictions on power supplies. A somewhat similar postion occurred about eighteen months ago when the serious coal strike of July-August, 1949, made it necessary to increase the restrictions for about five weeks. This contributed substantially to the loss on the Commission's operations of £349,368 for the year ended June 30, 1950, according to the annual report, a copy of which we have just received.

Yet despite the restrictions, the maximum demand upon the State system during that year exceeded 500 MW for the first time—being 70 MW above the 1948-49 figure—although generating capacity was increased by only 30 MW.

Revenue

The Commission's income from all sources totalled £10,338,657, an increase of 17·4%, the revenue from the sale of electricity alone amounting to £9,446,008, which was considerably higher than in the previous year. This was due to an increase of 9% in units sold which, with bulk supplies, totalled 1,880 million. Domestic sales, 27% of the total, rose by 19·3%, with 16,315 new consumers being connected during the period under review. Indeed, the average annual consumption per domestic consumer rose a further 186 kWh to 1,556 kWh for the year, the average price per unit sold to domestic consumers also increasing from 1·517d. p.u. in 1948/49 to 1·554d. in 1949/50.

At June 30, 1950, the Commission supplied 391,005 consumers, for, despite construction setbacks, a record number, 18,870, were connected during the year, of which 66% were outside the metropolitan area, including 1,322 farms. The Commission, in fact, is making very good progress in its rural development work, now supplying 15,741 farms.

Station Extensions

Generating capacity at June 30, 1950, totalled 508,465 kW, to which is expected to be added this year a 30,000 kW turbo-generator at Newport power station, six 830 kW diesel sets at the Shepparton station, and a similar number at Warrnambool. A 38,000 kW set is also scheduled for completion at the Richmond station next winter. Newport power station, at present the largest station connected to the State generating system, now has four 30 MW sets and one 18 MW unit, and the installation of a further boiler early this year will complete the project as so far planned. Yallourn will, of course, eventually be the Commission's largest station, the erection of the boiler plant in the "C" power house having commenced some time ago. For the "D" station, orders have already been placed for four 50 MW turbo-generators, as we have recorded.

At the moment, considerable interest is being attached to the progress on the Kiewa hydro-electric project, which is to have a total installed capacity of 289 MW. So far only the No. 3 generating station is operating, but it is hoped that the No. 4 station, with its four 15 MW sets, will be running in 1952-53. Work is also fairly well advanced on the No. 5 station, to be of 32 MW capacity.

There have been delays too in constructional work at the Richmond power station, which, at the moment, is planned to house one 38 MW turbo-generator and two 165,500 lb/hr oil-fired boilers. The set is expected to be in operation with one boiler by the winter of 1951.

Details of the Murray Valley Regional Scheme, which was given official approval in August last, have already been noted in our "Overseas News" pages. This scheme provides for a 220 kV line from Kiewa to Mildura and the establishment of additional diesel generating stations at Shepparton, Mildura and Swan Hill.

In an effort to ease the difficult fuel situation appertaining in Victoria, the Commission has arranged for more boilers to be equipped to use oil fuel, but this too has entailed further complications which are reflected in the stations' efficiency and operating costs.

Coal Winning

However, the Commission's other main activity, the winning of brown coal from Yallourn and Morwell, is being stepped up utilising an overburden dredger with an output of 1,000 tons/hour and a bucket wheel coal dredger capable of excavating 500 tons/hr. At the Yallourn opencast, coal production amounted to 6,404,059 tons in the year to June 30 last, compared with 5,249,308 tons in the preceding year. Of the former figure, 4,075,075 tons were delivered to the Yallourn power station and 2,328,984 tons to the briquette factory. At the Yallourn North open cut, 764,911 tons of coal were produced for the Newport power station and industries.

On the power transmission side, work on the Kiewa-Melbourne 220 kV line is proceeding apace. The patrol road is completed, and many of the fabricated towers ordered from Britain have arrived in the past few weeks.

And finally, the Commission draws attention to the increasingly serious position of the three provincial tramway systems operated. For 1949-50, with a revenue of £171,504, a loss of £125,989 was suffered. It suggests that the tramway systems be supplanted by diesel buses at Geelong and by trolley buses at Ballarat and Bendigo.

Troubles—and Remedies

A series of trouble-shooting tables specially compiled to assist maintenance engineers in rapid fault diagnosis

No. 5. SINGLE-PHASE F. H. P. MOTORS (Repulsion Induction, Split Phase and Capacitor Type)

By S. SPENCE, B.Sc.

SMALL motors and particularly fractional horse-power machines forming part of a comparatively large equipment or plant, are apt to be located in inaccessible positions where ventilation is often very restricted and where working examinations are difficult if not impossible. It is, therefore, desirable in such circumstances for the maintenance engineer to become familiar with audible symptoms of departure from normal operation which may indicate the need for further investigation by removing the motor for a thorough examination. In any event, it is wise to adopt a more frequent periodical maintenance schedule and in cases where such motors hold key positions in large installations, stand-by motors should be available to ensure the plant being kept in continuous service.

SYMPTOM	CAUSE	REMEDY
General overheating of frame.	Overloading which may be due to :— (*a*) Increase of applied load. (*b*) Wear or defect in the drive or driven machine. (*c*) Partial seizure of or stiff bearing. (*d*) Motor being subjected to more frequent starting operations than it was designed for, with resultant frequent passage of heavy starting current through the winding.	(*a*) Reduce load or install larger motor. (*b*) Overhaul or repair as found necessary. (*c*) Overhaul or renew bearing. (*d*) Reduce the number of starting operations or install a replacement motor of higher current rating. *See Note 1.*
	High ambient temperature.	Reduce by improving ventilation. Alternatively change location of motor.
	Adjacent source of heat.	Modify drive to enable motor to be removed from the path of the transmitted heat. Alternatively interpose a suitable protective barrier between the motor and the source of heat.
	Restricted internal ventilation of motor due to obstructing dust deposits.	Dismantle motor for thorough cleaning of internal ventilating ducts, etc. Adopt any practicable measures to prevent or reduce ingress of dust, etc., to interior of motor.
	Open circuit in one half of stator winding consisting of two parallel circuits, thereby resulting in the sound half of the winding being overloaded.	Locate and repair the defect in the winding. (The stator of these small motors is often wound in two sections which can be connected in the terminal box either in parallel for say 120 V or in series for 240 V.)
	Split Phase and Capacitor Motors. Operating continuously on the starting winding due to: (*a*) Manually operated starter handle in wrong (i.e. "Starting") position. (*b*) Centrifugally operated switch not functioning to cut out the starting winding as a result of the switch parts being worn or defective or clogged with dust, etc. (*c*) Magnetic switch not functioning to cut out the starting winding as a result of burnt contacts or defective coil. (*d*) Excessive starting load.	(*a*) Take necessary steps to prevent starter handle being left or accidentally moving into "Starting" position. (*b*) Thoroughly clean and overhaul the switch and renew worn or defective parts as may be found necessary. (*c*) Overhaul switch, effecting renewal of contacts and coil if necessary. In the case of capacitor start type of motor the intermittently rated starting condenser will overheat if left permanently in circuit and may require renewal. (*d*) Reduce starting load or install a larger motor.

SYMPTOM	CAUSE	REMEDY
General Overheating of frame (*Continued*)	**Repulsion Induction Motor.** Operating continuously as repulsion motor (i.e. with the rotor winding in "Starting" connection) due to :—	
	(*a*) Governor gear not functioning to short circuit the rotor, as a result of the mechanism being worn or clogged with dust, etc.	(*a*) Thoroughly clean and overhaul the governor gear, renewing any worn parts as may be necessary.
	(*b*) Incorrect brush position resulting in the torque being insufficient to allow the motor to reach the speed for changeover to induction motor operation.	(*b*) Correct the brush position to produce the necessary torque and mark the position clearly for future guidance when re-assembling motor after overhaul.
	(*c*) Excessive starting load.	(*c*) Reduce the starting load or install a larger motor.
	Repulsion Induction Motor. Rotor winding not effectively short circuited at the commutator due to burnt or defective contacts or short-circuiting bracelet.	Overhaul and renew all defective contacts and/or commutator short-circuiting bracelet.
Overheating of part of frame only.	High resistance earth fault in winding, due to failure of insulation, resulting in overheating of a portion of the winding only.	Dismantle motor and repair defective portion of the winding.
	Short circuit between turns or coils of the winding, resulting in overheating of a portion of the winding only.	Dismantle motor and repair defective portion of the winding.
	Fouling of rotor due to :—	
	(*a*) Worn bearings.	(*a*) Renew bearings.
	(*b*) Play between bearing and its housing.	(*b*) Take up play by suitable packing or by building up (metal spraying or welding) housing to correct size to secure bearing in position.
	(*c*) Stator core loose in frame.	(*c*) Re-secure core centrally.
	(*d*) Rotor core loose on shaft.	(*d*) Do.
	(*e*) Displacement of end-bracket spigot due to excessive vibration slackening assembly bolts.	(*e*) Re-secure end bracket in correct position and remove cause of vibration.
	(*f*) Displacement of core laminations into the air gap.	(*f*) Adjust the displaced laminations.
	(*g*) Obstruction, in the form of foreign matters, in the air gap.	(*g*) Dismantle motor for removal of all foreign matter.
	(*h*) Rotor located eccentrically.	(*h*) Centralise rotor in stator bore.
Hot bearing (all types).	Imperfect alignment of coupling or gear drive.	Re-align correctly.
	Driving belt too tight.	Reduce belt tension.
	Driving belt too far from bearing (due to excessive overhang of pulley).	Modify belt drive accordingly.
	Heat transferred from rotor or stator.	See causes of general overheating of frame.
	Adjacent source of heat.	
	High ambient temperature.	
Hot bearing (ball type).	Diametric clearance too small.	Fit new bearing having larger clearance. See *Note* 2.
	Incorrect fit :—	
	(*a*) Inner race too tight on shaft.	(*a*) Polish shaft and re-fit bearing, making race a tight press fit (an interference fit) to prevent "creep."
	(*b*) Outer race tight in end-bracket.	(*b*) Polish end-bracket housing as necessary to make bearing race a sliding fit on its seating.
	Too much grease.	Remove excess grease.
	Wrong grade of grease.	Replace by suitable grade.
Noisy or rough bearing (ball type).	Excessive wear.	Fit new bearing.
	Defective (flatted or chipped) ball.	
	Fractured cage or race.	
	Movement of bearing race :—	
	(*a*) Inner race loose on shaft.	(*a*) Build up shaft (by metal spraying process) and machine to correct diameter. Fit new bearing.
	(*b*) Outer race loose in end-bracket.	(*b*) Bore out and bush end-bracket to correct diameter, or build up and machine, or fit new end-bracket. Fit new bearing.

SYMPTOM	CAUSE	REMEDY
Vibration of motor.	Inadequate foundation.	Re-make or strengthen foundation.
	Insecure mounting.	Secure mounting bolts, etc.
	Rotor out of balance.	Correct balance.
	Pulley, coupling or pinion out of balance.	
	Out of alignment.	Correct alignment.
Motor fails to start when switched on.	Fuse or fuses blown in switch fuse or distribution fuse board.	Renew fuses.
	Rotor pulling over into contact with stator core.	Renew worn bearings or centralise rotor.
	Open circuit in stator winding, switch, starter or wiring.	Locate and rectify break, defective switch or starter contact, loose motor or starter terminal connection, etc.
	Excessive friction in driven machine.	Overhaul and lubricate machine and bearings, reducing tension of any tight belts, etc.
	Rotor of repulsion induction motor left short-circuited or starting winding of split phase or capacitor motor left out of circuit after the motor was last switched off, due to defective operation of governor gear or centrifugal switch.	Overhaul and adjust governor gear or centrifugal switch as necessary to ensure satisfactory operation.
	Incorrect brush position of repulsion induction motor which may be due to inaccurate assembly after overhaul.	Correct brush position and ensure that it is clearly marked for future guidance.
	Repulsion induction motor brushes not making adequate contact with commutator due to (*a*) brushes sticking in their holders as a result of dust deposits, (*b*) weak brush springs, (*c*) wear of brush-lifting mechanism or brushes.	Clean and overhaul brushgear and brush-lifting mechanism to obtain satisfactory performance.
	Open circuit in repulsion induction motor rotor winding or at commutator connection. (Previous overheating may have melted solder at commutator joints.)	Locate and repair open circuit, remaking any defective soldered joint.
	Short circuit or earth fault in rotor of repulsion induction motor.	Locate and repair fault. A simple test for a shorted rotor is to lift all the brushes clear of the commutator and apply full voltage to the stator. Should the rotor be shorted there will be a distinct pull on the rotor into a certain position. If there is no tendency for the rotor to pull round, drop one brush only on to the commutator and if the rotor then pulls round, an earth on the rotor is indicated.
Repulsion induction motor starts up in the wrong direction.	Incorrect brush position. Displaced from neutral axis in wrong angular direction.	Correct brush position by moving round commutator (about 60°).

Note 1. Current operated overload trips of the automatic re-setting type should not be used with fully automatic equipment as this will permit repeated re-closing of the circuit on overload, with resultant overheating. Hand re-setting is essential with current operated devices, but automatic protection can be afforded by fitting a direct temperature operated (built in) device which opens the circuit when the motor reaches a predetermined maximum temperature and permits automatic re-closing of the circuit only after the temperature has fallen to a suitable predetermined lower value.

Note 2. A small amount of diametric or running clearance is desirable for accommodating the minute inaccuracies which are unavoidable. It must also be provided in the bearing to allow for any expansion of the inner race or contraction of the outer race which may be caused by interference fits or variation of temperature.

Ball and roller bearings are made with three different ranges of diametric clearance usually known as "O," "OO" and "OOO," these identification marks being stamped on the races. The standard ranges for electric motor bearings are "OO" for ball races and "OOO" for roller races.

Note 3. Repulsion-induction motor. There is a type of repulsion-induction motor now available which has the distinctive feature and advantage of a rotor with no centrifugally-operated commutator short-circuiting and brush-lifting device.

The rotor contains two distinct windings, a commutator winding (similar to a d.c. armature winding) in outer slots and a squirrel cage winding in an additional set of inner slots. Corresponding outer and inner slots are joined by narrow slits in which are located thin metallic strips. Exceptionally good performance in the form of high power factor and efficiency is claimed by the makers, who also point out that due to the exceptionally good commutation, the maintenance of commutator and brushgear has proved to be negligible.

Wiring the £1,000 house

Designs submitted by 300 Architects reveal prevailing views on domestic installations

CAN you design a house for a family of five, that will only cost £1,000 to build? That was the question posed to architects by our contemporary, *The Builder*, and a competition with a first prize of £250 was arranged to encourage attention to the problem. Some three hundred entries were received, and the complete collection of plans and reports was exhibited in London last week. Apart from their direct interest as examples of the trend in architectural thought, these designs had special attraction for the electrical contractor, in that they revealed on a country-wide basis the attention given by the architect to the electrical installation in the planning stage.

It was with this valuable feature in mind that the ELECTRICAL TIMES arranged for the inspection of the designs with reference to their electrical features. A wide variety in both details of approach and ideas of current costs was revealed, but before these are discussed it is necessary to appreciate the conditions of the competition.

Competing architects were permitted to depart from the letter of existing bye-laws and from the standards imposed by the Housing Manual, provided that comfort in living was not impaired and that constructional stability and general amenity were assured. The houses designed had to be capable of being built as part of a terrace for between £900 and £1,000 with labour costs based on Grade A rates. Adequate provision had to be made to cover such items as heating, lighting and hot water storage, etc. The price, which had to be certified by an independent chartered surveyor, had to include the complete cost of the building and fittings, including service charges, but excluding roads, sewers and land.

General Review

Three eminent architects were appointed to judge the competition, and they submitted a report on the designs as a whole which emphasises that promising ideas are to be found even in the entries which did not receive awards, and records their conviction that the "good looking house containing three bedrooms and otherwise providing efficient and comfortable accommodation for a family of three persons" is possible for £1,000.

Some general architectural trends that affect the electrical installation are noticeable. The floor area is down to 850 sq ft in most designs, and the height of rooms is also reduced to about 7 ft 6 in. The reduction in superficial area is usually obtained by reducing the "unlived-in space." A working kitchen adjoining a living-dining room is common. Methods of construction are, on the whole, orthodox. Some first floors were in reinforced concrete, but most use the traditional construction of timber joists, boarded. Perhaps the greatest diversity of thought occurred over the provision of heating. Convector fires in a central position, often with a back boiler were the most popular solution, but many other designs, including even electric panel heating, were presented. Generally, the provision of cookers, refrigerators and even water-heaters was left to the tenants, and both gas and electric main services were laid on to give freedom of choice.

Electrical Installation

Costs for electrical installations varied from £63 to £14. These figures were obtained from the quantity surveyors' reports which accompanied the designs, and these varied much in their detail, so that the basis of calculation was not always apparent. The higher quotations often included the provision of some electrical appliances, but this is not so in every case. So far as was possible, the estimates allowed for electrical work without the addition of builders' profit and charges for cutting away and making good was noted. On this basis, the estimate for electrical work lay between £25 and £35 in half the examples examined. Where full details were given the "pounds per point" method of estimating had been adopted, and in the cases where the quantity surveyor indicated that a quotation had been obtained from a contractor or from an Electricity Board to carry out the work, this method of pricing appeared to be

adopted. There was a wide variation between the sums allowed, and these did not seem to follow any geographical or constructional pattern. Taking lighting points first, the price per point for simple one switch, one lamp jobs varied from 27s. 6d. to 60s., and instances of intermediate prices were spread evenly over the intervening range. For power points the corresponding extremes were 40s. and 95s., if a case where a ring main installation was logically estimated as a unit is excluded.

The ring main idea seems to have established itself with the architect, and was specified in many instances. There does, however seem to be some confusion of the technical details of its application, and cases were to be found where "the standard ring main system of wiring" had been specified with other than 13 amp. socket outlets.

Adequate Wiring

Remembering that the whole accent of the competition is on low-cost housing, it is interesting to compare the provision of lighting and power points with what the trade regards as adequate. Lighting is found to be fairly well provided for, and such details as two-way switching for stairs and principal bedrooms, and careful siting of lamps in the kitchen have received attention. Where the inadequacy of the designs does stand out is in the retention of the one room, one socket provision. This is so in spite of the wide adoption of the ring main, and the only noticeable departure is the provision of one 2 amp rated socket outlet in some living rooms to provide for the radio. Against this failure to meet probable requirements and to get away from the long trailing flex, must be put the far greater readiness to provide power points in bedrooms for occasional electric heating.

Total lighting points for the houses were usually nine or ten, though the range covered in the specifications examined was from seven to twelve. Nearly half the plans called for ten lighting points, and a further quarter for nine. Power points spread more evenly over totals from three to seven, with one outlier at ten. This occurred with an architect whose respect for the convenience of things electrical was argued by his inclusion in addition of points for a cooker, a washboiler and an immersion heater.

Information on the extent of the electrical installation was usually available only in the detailed list of quantities and in the reports accompanying the drawings. Even amongst architects who thus showed that they had given careful thought to the electrical equipment of their houses, the practice of marking on the plans, positions of lights, switches and socket outlets was comparatively rare. Of the drawings examined, only one-fifth were so marked.

Appliances

The figures quoted above for the provision of power points is of course related to the number of electrical appliances installed in the house as handed over to the tenant, and to the electrical apparatus which it is envisaged that he will buy for himself. However, further information on this matter was available in some of the reports which accompanied the drawings.

Probably the most common "extra" in the installation was an immersion heater in the hot water storage tank, especially when the general hot water system was based on a back boiler, which is unlikely to be working in the summer. Even where this was not installed as part of the fittings of the house, it was quite common to provide that the hot water storage tank should be flanged to take a heater if one was subsequently desired, and a convenient socket outlet was accordingly arranged. Cooker controls were fairly frequently called for, although the general tendency throughout the designs was to allow the tenant choice of power for cooking —and to assume that gas would be the choice.

Electric fires were installed in the walls of some rooms, and there was one example at least of electric panel heating. One architect also declared specifically in favour of electrical water heating for all-the-year use, declaring that experience had shown that "the properly designed and well insulated two-stage water heater is completely practical for low incomes."

Some thought had obviously been given to the placing of meters, and the traditional under the stairs siting was in a minority. Beyond disliking this position, however, there was little agreement. Some designers decided that the commonly-provided indoors store room was the ideal position, but how this would appeal to meter readers is very problematical.

Wiring

The method of wiring was the least specified of all electrical details. In general, the method adopted was t.r.s., with one or two examples of its protection by metal conduit when it is embedded in plaster. Light metal conduit with v.i.r. appeared in one or two instances, and there was at least one case where lead-covered cable was specified.

The provision of mains services was required,

as stated above, to be taken into account in costing the house. Provision for a charge by the Electricity Board varied considerably, presumably according to the past experience of the architect concerned. Where specific provision was made, it was usually at the rate of about £5 per house, although £2 10s. was mentioned in one case.

Conventional methods of bringing in the electricity main supply were usual, but there were some departures. Amongst these was a proposal that the mains should run at the back of the house, close up to the walls to save long services, and another calling for the electricity mains to be run along the front of the terrace at ground floor ceiling level.

Winning Designs

The design which won the £250 first prize was submitted by two Northampton architects, Mr. J. L. Womersley, A.R.I.B.A., and Mr. G. Hopkinson, B.Arch., A.R.I.B.A. They considered that where the object is to economise, it is unrealistic to provide the luxury of alternative methods of cooking, and so they avoid bringing gas mains on to the site. An electric control panel for cooker and wash boiler is included in the kitchen, and the boiler is provided as part of the fittings. No allowance is made for the cooker, as it is felt that this may well be hired.

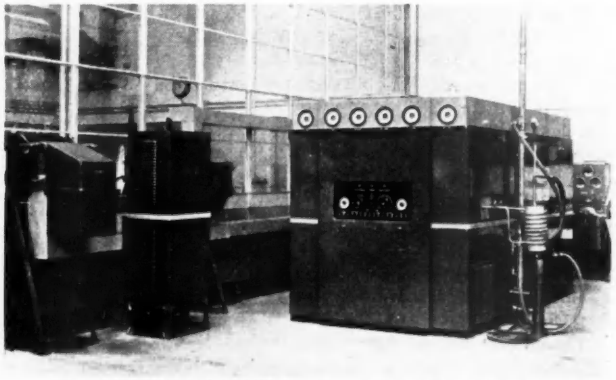
Two power points are provided in the living room, and one in the kitchen. This last is placed with the application of a convector type clothes drier in mind. Two of the bedrooms have power points provided, the other, principal room being provided with a built-in panel fire. There are ten lighting points, including two in the large living room. The cost of the electrical installation was given as £42, including outlet for the cooker, provision of a copper, and one fire panel and screen.

Positions of electrical socket outlets and lighting points are shown in the plans of the second prize winners, Edward Narracott and Associates, A. & L.R.I.B.A., who otherwise gave few details of their electrical installation. Ten lighting and seven power points were involved. In the design of the third prize winner, Mr. N. Underhill Diplock, no electrical details are given in the plan, but it is notable that two-stage electric water heating is applied.

LARGEST VALVE-DRIVEN H.F. GENERATOR IN EUROPE

STATED to be the largest valve-driven h.f. generator in Europe, a new induction heating unit has been recently installed at the Hatfield Works of De Havilland Propellers Ltd., by Philips Electrical Ltd.

The generator, which has a continuous output of 150 kW and an intermittent loading of 200 kW, has been installed for hardening purposes, operates on a nominal frequency of 275 kc/s, with a 50-cycle input of 280 kVA at 0·9 p.f., and is known as the F.280. It has a built-in variable coupling transformer for on-load regulation of output power, designed for manual or automatic operation.



The 150kW Philips F.280 generator installed at Hatfield

The valve complement of the F.280 consists of one oscillator, one grid bias, and six rectifier valves. Two spare valves are housed in the generator. The filament voltage of the oscillator valve is maintained constant by an automatic motor-driven regulator. A wide choice of automatic operating-time ranges is effected by the fitting of two synchronous motor timers.

The equipment measures approximately 7 ft in height, 4 ft 6 in. in width and 12 ft in depth, weighs 3 tons. For ease of transport the heavy components are readily removable and the framework of the whole equipment divides into two sections. Safety interlocking is provided.

Problems and Practice

IN ENGINEERING

Leakage Test Panel

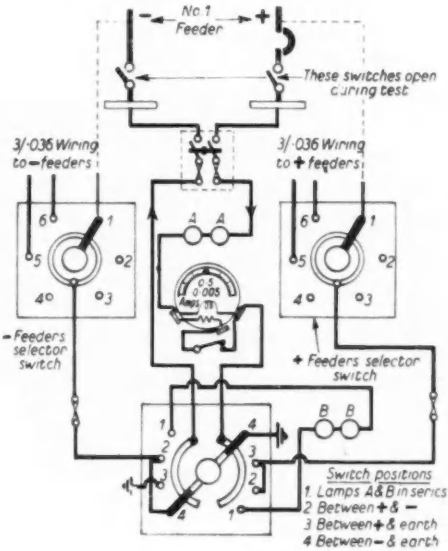
THE resistance/temperature characteristics of metallic filament lamps can be usefully employed if the lamps are connected as shown below.

For many years a 500 V d.c. tramway system in the tropics employed the old Board of Trade leakage measuring arrangement. This comprised a selector switch for the respective feeders and a two-way switch connected in turn to test lamps (to ascertain if there was a heavy leakage) and to a leakage indicating milliammeter. Fig. 1 shows these connections.

On numerous occasions the switches and milliammeter were badly damaged, either by the switchboard attendant forgetting to return the two-way switch to the "lamps" position before moving the selector switch, or by the occurrence of a heavy leakage during test. The two-way switch difficulty could have been overcome by fitting a spring-loaded two-way switch to the "lamps" position but a heavy leakage during the test could not be easily catered for by overload devices.

To obviate these difficulties the circuit was wired as in Fig. 2. A metallic filament lamp, for example, one of 240 V of 60 W, has a resistance of approximately 85 ohms when cold. Thus two in series at 170 ohms reduces the scale reading of the milliammeter, when measuring a low insulation leakage of 17,000 ohms by approximately 1%; this error becomes insignificant on higher I.R. readings.

Fig. 1. Leakage measuring connections


No. 1 Feeder
These switches open during test
3/·036 Wiring to − feeders
3/·036 Wiring to + feeders
A A
B B
0·5 0·005 Amps. TH
− Feeders selector switch
+ Feeders selector switch
Switch positions
1. Lamps A & B in series
2. Between + & −
3. Between + & earth
4. Between − & earth

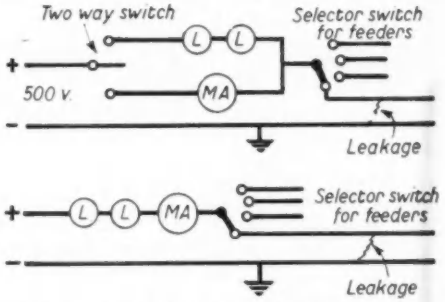


Fig. 2. Alternative indicator lamp connections

A "dead short," on the other hand, between the overhead line and earth would pass only 0·25 amps through the testing circuit. Sixty-watt lamps were selected as a compromise between instrument error and maximum leakage current but any pairs of lamps of suitable voltage and wattage could be selected to suit the testing instrument. The testing instrument is fitted with a push-button switch connected in series with the shunt to give readings of 0·005 amps (open) and 0·5 amps (closed).

When the tramway system was changed over to trolley bus working the negative was disconnected from earth, as it was found that during heavy tropical storms, and in spite of rubber mats and insulated stanchions, shocks were experienced by passengers boarding the buses. Another advantage of unearthing was the lessened danger of electric shocks from falling overhead wires.

To carry out tests between positive and E, negative and E, and between positive and negative the switch shown was devised and may be of interest.

The lamps B are a refinement to check continuity of all test lamps. The four 500 V high rupturing capacity fuses were provided to safeguard and isolate, if necessary, the wiring and switches.

If the tests are carried out in the early

morning before switching in the feeders, warning is given of overnight faults due to storms. When making the tests all trolleys must be "dewired," or the Depot switched out. Pilot lamps, if fitted, in traction pillars should not be permanently connected across the positive and negative.

In addition to the test panel six lamps are connected across the busbars with centre point earthed to give warning of a sustained earth on either pole during service.

There seems to be no reason why the use of lamps in the way described should not be applied to a.c. circuits employing rectified and sensitive milliammeters or recording instruments.—*K. Coombe*, A.M.I.E.E., A.M.I.Mech.E., *Capetown.*

Tap off Strapping Wire

DURING a stay at a friend's house I noticed that an apparently convenient socket outlet was ignored, preference being shown for an outlet in another room or plugging the apparatus into the lighting point according to the length of flex available. As both practices are bad I enquired why this was so, as I noticed I had seen this plug used and it was in good condition. I was told that soon after this socket outlet had been installed it refused to function, the electrician was informed and he found it working all right when he called but it again lapsed into its former state and refused to work. It was noticed, however, that at times it could be used. I traced the wiring back to a junction box which had been put in solely to feed this point, and after more checking found that the one wire had been tapped off one of the strapping wires of a two-way controlled light.

Of course, once this was established it was obvious why the point would operate intermittently.

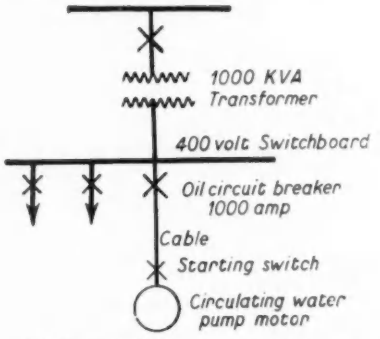
I should point out that the entire installation in the house had been carried out with a one-colour cable; this may have complicated matters as there was evidence of several attempts to find a neutral without getting too many floorboards up. I also had to change the polarity over at the fuse-board as the neutral was at the switches.—*R. T.*

Overcurrent Protection,

A RECENT electrical system disturbance was responsible for shutting down a large circulating water pump in a power station, and an investigation was made to ascertain the cause. This motor has a full-load current of 890 amps and is supplied from a switchboard as shown in the accompanying diagram. The transformer supplying this switchboard is of 1,000 kVA capacity and is protected by a Merz-Price circulating current system, with the current transformers delta-connected on the secondary side, ratio 1,500/2·89 amps. The overcurrent fuses in the circuits are 10-amp rating, giving a minimum operating current of 5,200 amps. The 1,000-amp circuit-breaker controlling this circulating water pump motor is equipped with 1,000/5-amp current transformers with instantaneous trips in each phase. These are shunted by 7·5-amp time limit fuses.

Tests were taken on the impedance of the trip coils and on the time required to operate with various values of current. On inspection of the starting switch located near the motor, it was found to have direct-acting overcurrent trips. The rating of the switch is 890 amps, and the trips were set to operate at 50% overcurrent, i.e. 1,335 amps.

Oil dashpots are fitted to this switch and operating tests were taken when it was found that the blue phase trip coil was more sensitive than the other two. In order to obtain the same operating characteristics as the others, it was found necessary to raise the setting to 70% overcurrent and to adjust the dashpot setting to the hole No. 8.



Feed to circulating water pump motor

The motor had been tripped out due to the blue phase trip being more sensitive than those of the two remaining phases. Typical settings for future operation are as follows:

Red Phase Trip 50% *setting No. 5 Hole*		*Green Phase Trip* 50% *setting No. 5 Hole*		*Blue Phase Trip* 70% *setting No. 8 Hole*	
amps	*time (secs)*	*amps*	*time (secs)*	*amps*	*time (secs)*
1,350	7·20	1,350	6·3	1,350	6·0
2,000	0·66	2,000	0·5	2,000	0·7

The circulating water pump is an essential auxiliary and should never be tripped out except under internal fault conditions or dangerous mechanical troubles.—*M. I. C. E.*

MACHINE TRANSIENTS

Mathematical analysis of sudden fault conditions emphasises basic assumptions

WELCOMED as the first British paper of its kind for some thirty years, "Transient theory of synchronous generators connected to power systems" attracted an appreciative and intensive discussion when presented to the Supply Section of the I.E.E. last week. The author, MR. B. ADKINS, M.A., A.M.I.C.E., M.I.E.E. (B.T.H.) introduced his paper with the comment that the problem discussed was closely related to that of transient conditions in large networks.

In the paper, an "ideal two-pole synchronous machine" is assumed, in which saturation is neglected and the magnetic circuit and all rotor windings are taken to be symmetrical with respect to the direct axis (in line with the field poles) and the quadrature axis (90° away). A current in any winding is assumed to set up a sinusoidally distributed m.m.f. wave in the air gap, and the appropriate components of the m.m.f. wave are similarly reckoned to produce sinusoidally distributed flux waves.

If this ideal machine is analysed, five equations are obtained relating five voltages and five currents. For solution the voltages applied and, since the equations are differential, the initial conditions, require to be known. After suitable mathematical manipulation a formula for phase current is obtained which contains five terms. These terms, it can be demonstrated, correspond to the five components found in the current oscillogram obtained when a three-phase alternator is symmetrically short-circuited.

First of all there is a double frequency second harmonic current, which is usually very small, and which can be neglected. Next comes a d.c. component, decaying exponentially with time, which produces asymmetry in the current wave. After this d.c. component has been deducted, a 50 c/s wave is left varying in magnitude with time, and having the same value for all three phases. This curve can be divided into three parts: a steady component, a slowly decaying a.c. wave (the transient component) and a rapidly decaying portion (sub-transient component).

If a sudden short circuit on a power system is considered, the resultant fault current flowing can be split up as above. In practice, some simplification is possible by ignoring certain matters: asymmetry, for example, produces no torque, and if it is ignored, equivalent circuits can be used to study the problem. Such circuits will be transient networks, employing operational impedances. If the rate of decrement of the current is now ignored, the circuits

Quantity	(a) Exact solution	(b) Neglecting armature resistance	(c) Formulae	(d) Test
x_d	1.443	1.443	1.443	1.25
x'_d	0.214	0.215	0.223	0.237
x''_d	0.149	0.145	0.148	0.149
T'_d	1.145	1.145	1.130	1.12
T''_d	0.050	0.049	0.049	0.0495
x_m	0.149	0.145	0.148	0.145
T_a	0.182	—	0.180	0.180

are reduced to the normal a.c. type. Further neglect of the sub-transient reactance makes possible the use of normal vector diagrams, and when zero transient saliency is assumed (quadrature axis reactance equals direct axis reactance) the simple picture of a back e.m.f. and a series reactance representing the machine is reached.

It is well to summarise the assumptions made for this representation—machine "ideal," armature and field resistances small, asymmetrical currents ignored, sub-transient component ignored, decrement of transient component ignored, and "zero transient saliency," assumed. This last assumption is the most doubtfully justified of the set. It invo'ves the quadrature axis synchronous reactance being equal to the direct axis transient reactance. (There is no separate transient component of the quadrature axis reactance.)

The description above only outlines Mr. Adkins' method of attack on the problem, which has as its aim the clear revelation of the assumptions commonly made. A numerical

SUPPLY HANDBOOK—1951

An up-to-date list of personnel of the British Electricity Authority, the Divisions and Boards, etc., is given in the 1951 edition of the "Electricity Supply Handbook", just published, price 3s. 6d., plus 3d. postage. Data of the number of consumers, units sold, etc., is given for the first time, and revised maps of the Board's areas, and a map indicating the generating stations and main transmission lines are included. Copies of the Handbook are now available from these offices.

example given as an appendix to the paper illustrates the correspondence of the values of reactance and time-constants calculated in various ways. These values suffice to calculate the symmetrical short-circuit current. They refer (*a*) to the exact solution, involving the exact solution of a fifth-order differential equation; (*b*) to a numerical method, with neglect of the armature resistance; (*c*) based on the use of equivalent circuits, which assume that interaction between the direct and quadrature axes, due to rotation voltages, can be ignored. The closeness agreement is to some extent fortuitous, and the real comparison is between columns (a) and (c).

DISCUSSION

PROF. M. G. SAY (Heriot-Watt College) reviewed previous work on machine analysis, leading up to Kron's tensor analytical methods. The present author had used circuits with assigned parameters, which was essentially an engineering, as distinct from a physical, approach. The table of solutions showed that the method gave results, and, further, that the calculation of parameters must have been carried out with great accuracy.

He suggested that it was time for a "new look" to come into the teaching of electrical machine theory with attention to transient rather than steady state operation. The author had given a valuable lead to the academic world.

DR. J. H. WALKER (B.T.H.) expressed appreciation as a designer to the author for putting equations into a usable form. They were particularly important for waterwheel generators, which might have to be used with long transmission lines. Synchronous reactance, normally considered as its approximate reciprocal, the short-circuit ratio, normally determined the extent to which an alternator would carry leading kVA on light load. The specification of transient reactance, should be governed almost entirely from system consideration. A 5% change in values can cost several thousands of pounds on a large machine. The necessary transient reactance having been determined, the synchronous reactance can be designed at a convenient value over a wide range, with little effect on the cost of the machine.

It would be useful if the author would extend his treatment to deal with phase to phase and phase to earth short circuits.

MR. L. W. JAMES (B.E.A.), was also disappointed that the paper dealt entirely with symmetrical three-phase short circuits. In the paper the assumption was made that transient and subtransient reactances remain constant. In actual practice, these values vary considerably with voltage. In the water wheel type of generator reactances are usually high compared with what is wanted, whereas, it must be introduced by special design in the case of the turbo type alternator. The reactance value could change by as much as 25% as the voltage varied from full voltage, and it seemed that this could be very important in fault current calculations, unless it was swamped by system values in large networks.

MR. M. W. HUMPHREY DAVIES (Imperial College), spoke of the value of the paper in teaching. He went on to consider some problems of saturation as applied to machine constants. The fundamental machine constant was the direct-axis reactance, based on the air gap line, and so unsaturated. Working from this basis, equations were developed suggesting the change in constants that would occur with saturation. It was possible to measure the direct and quadrature reactances on large machines under load conditions on large systems, without interfering with the working of the system.

MR. L. D. ANSCOMBE (B.T.H.), believed that the difficulty with the discussion was that the whole treatment of the author's paper referred to the ideal machine with laminated, salient poles. The water wheel generator was the nearest to the ideal machine. In the case of the steam turbine driven alternator, the effect of the solid poles can be taken into account by varying the constants, these being determined empirically. Empirical constants also have to be used to take care of such matters as leakage paths.

MR. S. NEVILLE (Metropolitan-Vickers), criticised some of the fundamental ideas with which the paper started. His comments concerned such matter as the use of a model in which windings are stationary with respect to the poles and yet have rotational e.m.f.s induced in them. It was uncertain if this model would suffice for unbalanced load conditions. Another question concerned the necessity for sine wave m.m.fs and fluxes, which would certainly not exist in a salient pole machine.

MR. R. GILL (Imperial College), described tests that had been performed to determine the direct and quadrature reactances of a 30 MW alternator in a B.E.A. South-Eastern Division power station. The reactances required were functions of the machine voltage, its terminal voltage, the current, and the angle between the machine voltage and the terminal voltage. The first of these values could be determined from the excitation and the open circuit characteristic, and the next two values could be readily measured in the tests. The angle was measured from the shaft, using a stroposcope device. The tests were made as the machine was being unloaded and the variation of the reactances with load was determined. The tests show that at full load the quadrature axis reactance is much greater than the direct axis counterpart.

MR. J. DOUGLAS, referred to three American papers which appeared in 1945, written by Rankine, of the General Electric Co., and compared them with the paper under discussion.

MR. G. LYON (A.E.I), wanted to know the effect of relatively large system resistance on machine behaviour as analysed. The data calculated, seemed to be remarkably accurate, and it was difficult to know how far such accuracy could be used.

The AUTHOR replied briefly to some of the points raised during the discussion.

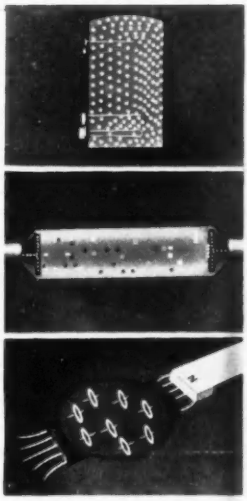
E.D.A. EDUCATIONAL FILMS

LAST Friday provided a welcome opportunity to preview three new films in the E.D.A. educational series, two showing fundamental principles and the third a particular application of electricity.

The first film, *What is Magnetism?* is a companion to the earlier *What is Electricity?* (reviewed in the ELECTRICAL TIMES for November 3, 1949), and it is scarcely necessary to say that it is a worthy companion. The elementary theory of magnetism, no easy matter to explain, is dealt with clearly and simply, with a liberal use of the cartoon technique, interspersed with actual experiments. A most unusual feature is a remarkable series of photo-micrographs taken at Nottingham University, showing actual domain reversal taking place in an etched specimen—believed to be the first time such a record has been made.

The second film, *Electricity and Light*, demonstrates the principles of conversion of electricity into light by filament lamps, arcs, and discharge tubes. This latter method, itself a stumbling block to many lecturers, is particularly neatly dealt with and a noteworthy feature is the use of Technicolor, which not only facilitates the explanation of the working principles of a discharge tube, but permits a thorough demonstration of the action of different phosphors.

The application of electricity in the home is shown in the third film, *Domestic Hot Water*, which should help considerably in stripping the water heater of its mysteries, from the elementary principles of convection currents to the action of a thermostat and the need for lagging.



Examples of cartoon technique used in the three films

All the films were produced by Merton Park Studios, Ltd., the producer being Mr. F. A. Hoare. Mr. J. Durst directed the first two, the third being handled by Mr. L. Gould-Marks.

There is little doubt that all three films maintain the high standard which those concerned have set themselves in this series of educational films, and it is hardly surprising to learn that more than 1,000 copies of these educational films have been sold, in addition to loan bookings.

Surge Fault-Location

A METHOD of locating faults in telephone lines by the injection at a terminal point of a pulse, and then measurement of the time between the transmitted pulse and its subsequent reflection, has been developed in this country during the past few years. Of greater interest to the power engineer, however, is a method of locating faults by using the surge generated by the fault as its own marker.

The original idea was propounded by R. F. Stevens and T. W. Springfield in the A.I.E.E. *Transactions*, Vol. 67, Pt. 2, 1948, and a digest in *Electrical Engineering*, November 1950, by R. W. Hughes and Nelson Weintraub, gives an account of the method as applied to the proposed Bonneville Power Administration communication system scheduled for 1954.

It must, however, be remembered, that American Power Systems are permitted to utilise their own point-to-point radio communication systems and are not restricted, as is the B.E.A. by existing legislation.

Assuming that a line exists between two terminal points, A and B, and a fault occurs on the line between them, then a steep wave front surge will travel along the line in both directions at the rate of 0·186 mile/microsec. If A is the recording station, the arrival of the surge there will cause an electronic time counter to be triggered. At B, the surge is detected, converted to a convenient size pulse and is then transmitted from B to A via a broad-band radio link. The arrival of this second pulse at A stops the electronic counter, and, from the elapsed time the location of the fault can be calculated. A comparatively simple supplementary equipment can be added at A to enable the fault distance to be read directly, and to allow for the recording of the information on a permanent record.

It can be seen that the great advantage of this system lies in the fact that every fault, whether sustained or not, is automatically recorded.

As electronic counters are available which can measure time intervals as small as 0·625 microsecs and as the propagation speed is 5·37 microsecs per mile it should be feasible to measure propagation times corresponding to an accuracy of almost one-tenth of a mile.

overseas news

Japan's Plan

A 15-year project of flood control, irrigation and power generation, has been planned by the Japanese Construction Ministry. It will involve the construction of 71 dams, at cost approximately 40 billion yen. Work is already under way for nine of the 36 dams which have been selected for the first stage of the scheme. The Kojika Dam on the Kumano River in Rii Peninsula will be 178 metres high, claimed to be the fourth highest in the world, and have a generating capacity of 750 MW. Capacity of the Sakuma Dam on the Tenryu River in Central Honshu will be 350,000 kW. The total generating capacity of the 36 dams will reach 3,108,200 kW or 70% of the power increase expected upon the completion of the whole 71-dam project.

Cheap Power in Tasmania

Charges for hydro-electric power in Tasmania should not be kept at the 1914 level indefinitely, declared the chairman of the Commonwealth Grants Commission, Mr. A. A. Fitzgerald, a few days ago, in reply to the Premier, Mr. Cosgrove. The latter had previously stressed that Tasmania was fortunate in that it could generate and sell power cheaper than mainland states. This had contributed greatly to the economic development of the state. If power charges were raised to the level of those in mainland states, the additional cost, on top of high shipping freights, could result in a decline in industrial development with most unfortunate results to the economy of the state. On the other hand, he did not accept the view that charges of hydro-electric power should be brought to parity with other states, solely for aiding the general revenue of the state. The Hydro-Electric Commission operated a state developmental undertaking on a basis of providing a service at cost. For this reason charges for power extensions to rural areas had been met from the budget. The chairman of the Grants Commission said it was wondered whether the H.E. Commission could bear those charges without having to raise its prices to any great extent.

Extensions

To provide for an extension of its electricity distribution system, the Box Hill City Council, Victoria, has approved a recommendation to borrow the sum of £40,000.

Small Plants for Queensland

The State Government has approved the recommendation of the State Electricity Commission for the purchase of 25 generating sets, at a total cost of £45,000. The generators are intended for installation as part of the special scheme for the electrification of small Western Queensland townships. Urgent action to place orders will be taken so that no advantage will be lost of the excellent deliveries offering. Provided the manufacturers adhere to their delivery promises all of these sets should be shipped by August, 1951.

Boilers Ordered

The Government of Victoria has approved the purchase of more boilers for Newport "A" station, it is announced. The boilers and associated plant will be supplied and erected by International Combustion (Aust.) Ltd. at a cost of £845,000. Control of Newport "A" station, by the way, was transferred from the Victoria Railway to the State Electricity Commission on January 21 last.

That Fuel Problem

One of the chief problems facing the Electricity Trust of South Australia in its examination of alternate sites for the new power station to be built by 1958, was the source of the fuel to be used, the chief engineer and general manager of the Trust, Mr. R. H. M. Lea, stated a few days ago. He emphasised that plans would have to be complete by 1953, but at this stage the use of atomic power on a large and commercial scale could not be foreseen as early as that. In regard to a conventional steam station it would be necessary to plan for supplies of New South Wales coal on a much greater scale than anything contemplated today, when the mines are incapable of meeting Australia's present requirements. A full investigation was therefore being made, for if Leigh Creek coal were to be used for a 300,000 kW station, about 2·5 million tons of coal would be needed each year. As the life of the station would have to be at least 30 years, they had to be assured of 75 million tons of coal from Leigh Creek.

Raiding the Funds

With the recently announced proposal to reorganise the supply industry in Manitoba, and the setting up of a provincial hydro-electric board to acquire the Winnipeg Electric Co., and probably ultimately the city hydro undertaking, the question of raiding the funds of the latter service has again been raised in Winnipeg. It is pointed out that the practice there began in 1938, when the City Council "lifted" $150,000 out of the Hydro surplus to balance the City's budget. In each ensuing year the performance was repeated, the amounts gradually increasing, until in recent years more than $1 million has been annually appropriated.

Up to 1950 a total of $6,297,000 of the earnings of the Winnipeg Hydro electricity undertaking was taken by the Council. But last July a special committee recommended that these raids on the funds be stopped. With the 1951 budget in preparation, and the new legislation in mind, the position is being closely watched locally.

Power Wanted

Unless work starts this year on the proposed St. Lawrence power project, Ontario citizens cannot hope for continuation of low-cost electrical power, Mr. R. A. Saunders, chairman of the Hydro-Electric Power Commission of Ontario, has warned. The alternative, he said, was steam power—at a cost three times that of hydro power. Ontario needed the St. Lawrence power by the winter of 1956 for the necessary work would take five years. It was necessary to have authority to go ahead this year. To back up his claim that Ontario Hydro consumers paid smaller bills than most others in Canada, Mr. Saunders compared the January bill of a consumer with similar figures published by the Dominion Bureau of Statistics. The Ontario consumer (a Toronto resident) paid $3.50 for a month's consumption, as compared with $6.00 in Halifax; $6.21 in Saint John, N.B.; $4.33 in Montreal; $4.24 in Quebec City; $4.07 in Winnipeg; $6.78 in Regina; $4.46 in Calgary, and $6.04 in Vancouver.

Bombay's Quest

An examination is shortly to be made of the distribution system in Bombay and the possibility of generating electricity by the Bombay Municipality. The latter body has decided to appoint a firm of consulting engineers to carry out this examination. The terms of reference to the engineers are, *inter alia*, to examine the present loading of the network and assess the foreseeable increase that should be taken into consideration; make recommendations as to the best means of utilising the existing cable circuits, transformer capacity and sub-station switchgear; and to submit proposals for improvements of the power supply by alterations and additions to the network, taking into consideration the advisability of introducing a higher system voltage. The consultants are also to report on provisions for the extension of the distribution system to the north of the island, and on additions in equipment which may be necessary to secure an improvement in the supply and greater overall economy of the undertaking.

Another scheme

In Afghanistan, the Governor of Mazar recently issued instructions that a plan should be prepared for the construction of a dam and electric power station to be completed within three years. A number of Afghanis have been collected to work on the scheme. It is thought that the project may be situated on the River Shirin at Khistpul, about 4½ miles from Maimana. Meanwhile, work on the Sarobi hydro-electric scheme continues.

Looking Ahead

For a power station to be built some time in the future the Bulawayo Town Lands Committee propose to set aside 115 acres of western commonage land. The City Electrical Engineer has told the Committee that though it is impossible at present to state when the land will be needed, it would be wise to make provision now before all suitable areas are allocated for other purposes.

Venezuela's Plan

During the past three years, various plans for the electrification of Venezuela have been drawn up by Venezuelan Government Departments, which includes a grid system to link the western, central and eastern zones. The schemes have, in the meantime, undergone various modifications, especially in regard to the location and capacity of the generating stations, but recently, the Electricity Department of the Venezuelan Development Corporation, which is now responsible for the planning and execution of the national electrification project, has completed a plan which may be carried out without the introduction of further changes. For the purposes of the latest electrification scheme, the country has been divided into four zones. Initially, each will be self-contained, but when the majority of the generating stations have been completed, it is proposed to connect the four local power networks, thus forming a large grid scheme, linking, as was the object of the original plan, western, central and eastern Venezuela, which would include the Caroni River hydro-electric undertaking. The main falls on this river, which constitutes the largest potential source of hydro-electric power in the country, are near to a centre of growing importance. The sum of Bs.74,160,000 has been allocated for expenditure on the electrification projects during 1951.

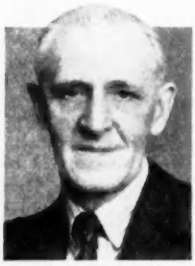
Supply in Penang

That ubiquitous gremlin "power shortage" reared its ugly head in George Town, Penang, some time ago, and what with the rehabilitation of the plant and the system following the Japanese occupation, Mr. S. Mortimer, the municipal electrical engineer and transport manager, and his staff have had a difficult task during the past few years. Much of the generating plant is becoming old, too, and in need of frequent maintenance, yet despite these troubles the Department's output in 1949 amounted to over 21 million units—a record—according to the annual report just to hand. This records that all available men were being used on the work of alteration of the internal structure of the Prai steam power station, and other alterations necessary for the installation of 6,000 kW Brush turbines from England. The installation of water heaters and cookers has been restricted due to the inability of the power station to supply peaks exceeding 6,000 kW, yet the undertaking's operations for 1949 resulted in a credit balance of $114,507.

PERSONALITIES

IN THE INDUSTRY

Generation engineer (construction) with the North Western Division of the B.E.A., **Mr. W. Kidd,** M.I.E.E., M.I.Mech.E., has recently retired. He had spent most of his time with the Manchester Corporation undertaking, after serving an apprenticeship with the North Eastern Marine Engineering Co., where he became assistant to the works manager, and later held appointments with the Yorkshire Brass and Copper Co., and the Palmer Steel and Iron Co. Joining the Manchester Electricity Department he was later appointed engineer at the Stuart Street generating station, and, at vesting day, was chief constructional engineer of the undertaking. Mr. Kidd claims the honour of having designed the first major urban 33 kV transmission scheme. He also developed automatic control of network and invented a system of remote control of substations. In addition he has been largely responsible for the complete reconstruction of the Stuart Street station, with an installed capacity of 180 MW, and the design of the new Carrington power station.



Mr. W. Kidd

Commercial officer for the Coxhoe and Durham district of the Wear Sub-area of the North-Eastern Electricity Board, **Mr. J. R. W. Rae** has been invited to become Mayor of Durham for the coming municipal year. He has been on the City Council for five years.

Assistant managing director of Broadcast Relay Service, Ltd., **Mr. P. Adorian,** M.I.E.E., M.Brit.I.R.E., A.F.R.Ae.S., has been appointed chairman of Redifon, Ltd., in succession to Sir Ronald Matthews. Mr. Adorian joined the Rediffusion Group in 1932, and has been largely responsible for the development of its manufacturing company, Redifon, Ltd. He is also president of the British Institution of Radio Engineers.

A distinguished gathering of some 450 guests attended a farewell dinner given at the Savoy Hotel recently by directors of the Pyrene Co., Ltd., to **Mr. W. B. Phillips,** chairman of the company, on his return to the United States. Mr. Phillips, who has played important roles in trade relations between the U.S. and this country, has been appointed president and chief executive of the Pyrene Manufacturing Co. of America, but retains the chairmanship of the British concern.

The news has just been released that **Mr. R. Crawford,** M.I.Min.E., Assoc.I.E.E., previously chief electrical engineer to the National Coal Board, has joined the Mine Safety Appliances Co., Ltd., as general sales manager, covering Britain and the Continent. He is also well known as this year's president of the Association of Mining Electrical and Mechanical Engineers. He started in the industry as a colliery electrician after service in the 1914-18 war. He is also familiarly known for his work as technical secretary to the Reid Committee in 1944-45, following which he returned to the Mines Inspectorate as deputy chief electrical inspector, a position he held till his appointment in January, 1947, as chief electrical engineer to the N.C.B.

Mr. R. Crawford

Following the retirement of **Mr. M. H. Jones** from the position of chief contracts officer to the English Electric Co., Ltd., **Mr. L. L. J. Turner** has now been appointed to that post. Mr. Jones had been manager of the Contracts Department for 25 years.

Dr. T. E. Allibone, who is in charge of the fundamental research laboratory of Associated Electrical Industries Ltd., at Aldermaston, is now visiting Greece and Turkey for the British Council to lecture on atomic energy and its industrial possibilities. The main purpose of the tour is for him to meet and talk to scientists, engineers and students, but he will also give public lectures.

Previously apprentice supervisor to D. Napier and Sons, Ltd., **Mr. A. T. Parker** has been appointed chief education officer to the Eastern Electricity Board.

Many readers will have spotted our slip last week in regard to the note on the retirement of **Mr. E. F. Hall.** Our hopes for a long and happy retirement, go of course to Mr. Hall. Although, no doubt, he will willingly share the wishes for continued good health with his successor, **Mr. J. Newton,** who takes over duties as power station superintendent at Brimsdown later this month.

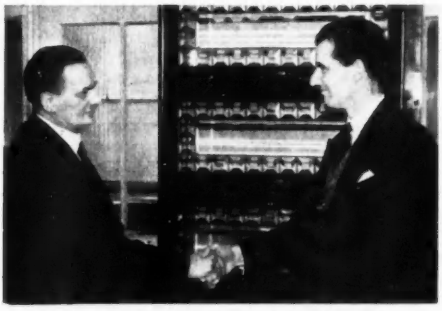
At the annual general meeting of the British Radio Equipment Manufacturers' Association last Friday, **Mr. P. H. Spagnoletti** was elected chairman in succession to **Mr. M. M. Macqueen,** who has been ill. **Mr. E. K. Balcombe** was elected vice-chairman.

The retirement is announced of **Mr. E. A. Evans,** M.I.Mech.E., F.R.I.C., chief chemist of the Wakefield group of companies. He joined C. C. Wakefield and Co., Ltd., in 1915 and is probably best known for his pioneer work in the use of metallic soaps in hydrocarbon oils. Consequent upon Mr. Evans' retirement, the following appointments within the Wakefield group are announced: **Mr. G. H. Thornley** M.Sc., Tech., F.Inst.Pet., is now group technical manager; **Mr. P. W. L. Gossling,** B.Sc., F.Inst.Pet., is group laboratory manager; **Mr. J. S. Elliott,** M.A., becomes group research chemist; and **Mr. N. E. F. Hitchcock,** B.Sc., M.Inst.Pet., is group development chemist.

Mr. J. Palmer, valve export manager of Mullard Electronic Products, Ltd., who recently celebrated his 25 years' service with that organisation, officially retired on January 31. Mr. Palmer was engaged in export business during the greater part of his career, and with the formation, on May 1, 1950, of Mullard Overseas, Ltd., he took over complete control of the company's valve interests abroad. On the occasion of his retirement he was presented with a number of gifts by **Capt. S. R. Mullard.** M.B.E., M.I.E.E., founder of the company.

Mr. W. C. R. Manning has been appointed a director of Ever Ready Co. (Gt. Britain) Ltd. He has served the company in various capacities for about twenty-six years.

Formerly well known as manager of the B.T.H. London District Lamp and Lighting Stores, **Mr. C. A. S. Attewill** has retired after more than 30 years' service with the company. He joined B.T.H. in February, 1920, and eventually graduated to the managership of the Wenlock Road, London, Stores. These premises were destroyed in 1941, and after a temporary sojourn in South Wimbledon, new and permanent premises were found, in Fitzroy Road, N.W.1. Mr. Attewill's retirement, which was unfortunately hastened by ill-health, was marked by the presentation to him of a magnificent antique bookcase from members of the B.T.H. London Area Lamp and Lighting Department Sales and Stores staff, on whose behalf **Mr. V. C. H. Creer,** B.T.H. director of Lamp and Lighting Sales, seen on the right in our photograph, made the presentation.



Mr. Attewill, left, receives good wishes

Mr. A. J. Catlin has been appointed manager of the Industrial Section of Truvox Engineering Co., Ltd., primarily responsible for the sales of the heavy duty floor polishing machine. Mr. Catlin has been with the company for over two years as area representative covering the south-eastern portion of England, including the Home Counties.

Today, March 1, **Mr. K. W. Williman** takes up his new position as radio sales manager of E. K. Cole Ltd. He has had a long association with the radio trade and will be remembered by many dealers for his pre-war activities with Roberts Radio. After war service he became sales manager of Tannoy. Later he made a business trip to Canada, and on returning took over export sales of Bonocord Ltd.

Mr. K. W. Williman

Just appointed to the position of district commercial manager, Newport district of the South Wales Electricity Board, is **Mr. E. W. Faithfull,** A.M.I.E.E., who since vesting day, has been district commercial officer, Aberystwyth district of the Merseyside and North Wales Board. He was, of course, previously borough electrical engineer and manager at Aberystwyth, having earlier been power sales engineer to the borough of High Wycombe from 1941 to 1946.

The Minister of Fuel and Power has re-appointed the following part-time members of Area Electricity Boards:

South-Eastern: Lt.-Col. Sir Merrik Burrell, Bt., C.B.E., J.P., and Mr. W. J. Oswald, A.M.I.E.E.

Southern: Mr. W. H. Lawson, C.B.E., B.A., F.C.A., and Lt.-Col. E. L. Luce, D.S.O., T.D., J.P.

South-Western: Mr. A. N. Irens, M.I.E.E., A.F.R.Ae.S.; Mr. G. H. Johnstone, O.B.E., D.L.; and Councillor S. H. Payne, J.P.

Eastern: Mr. W. Newcome-Baker, C.I.B.A.E.

East Midlands: Alderman J. Minto, J.P.

Midlands: Mr. C. R. Heathcock, F.C.I.S.; Mr. J. McDowall; and Mr. G. B. Partridge.

South Wales: Mr. L. Parsons.

Yorkshire: Alderman J. H. Bingham, J.P.; Mr. R. E. Crowe; and Councillor H. Fairbotham, J.P.

North-Eastern: Col. E. G. Angus, C.B.E., M.C., T.D., D.L., and Alderman C. F. Sanderson, J.P.

North-Western: Mr. J. R. Potts, J.P., and Mr. E. J. Smith.

Powell Duffryn Carbon Products Ltd. announce that **Mr. A. W. Morrison** has been appointed a director. He had been in charge of the expanding Chemical Carbon Division at the company's works at Hayes, Middlesex. Mr. Morrison is shortly leaving for the United States in connection with the business of the firm.

Following the recent retirement of **Mr. A. B. Gibbons** from the board of Nalder Bros. and Thompson Ltd., **Mr. D. W. Nalder,** director and a son of the original founder of the company, has been appointed secretary. **Mr. A. R. Miller, Mr. F. E. Pomeroy** and **Mr. E. W. Semmens,** all having over 35 years' service with the company, have been appointed directors as and from February 14. **Mr. A. G. O'Neill,** M.I.E.E., continues as chairman and managing director.

Mr. C. K. F. Hague, deputy chairman and managing director of Babcock and Wilcox Ltd., has been elected a director of Power Securities Corporation, Ltd., to fill the vacancy caused by the death of Lt.-Col. Sir John Greenly.

Previously tramways engineer to the Wellington (New Zealand) County Council, **Mr. J. W. F. Welch,** M.I.E.E., A.M.N.Z.I.E., has been appointed chief engineer to the Auckland (N.Z.) Transport Board.

OBITUARY

We note the death in Dublin on February 21 of **Mr. C. S. Perry,** A.M.I.E.E., aged 71, who, many years ago, served in the Lots Road generating station of London Transport.

We note the recent death of **Mr. W. A. Maddick,** aged 69, who had been manager of the Southampton branch of the Edison Swan Electric Co., Ltd., for many years.

The death occurred on February 15 of **Mr. Herbert Hawkins** aged 76, managing director of Alexander Hawkins and Sons, Ltd., of London Road, Southwark, S.E.1.

For many years a director of Asea Electric, Ltd., **Mr. R. A. Marples** died on February 26, aged 80. He originally joined the company in 1915 from Messrs. Marples and Leach (formerly Adnil Electric) as manager of the motor dept. He retired in 1938.

The death occurred on February 5 of **Mr. C. R. St. John,** aged 67, who served with Ferranti, Ltd. and Johnson and Phillips, with whom he became installation engineer in the outside contracts dept., being mainly engaged on superintending the erection of large h.t. switchboards. Later he practised as a consulting engineer, and was responsible for the establishment of several supply undertakings, notably Horley and St. Mary's (Scilly).

WILL.—**Mr. Percy Good,** C.B.E., M.I.E.E., F.C.G.I., director of the British Standards Institution, left £17,676 (£16,247 net value).

Mr. M. H. Galsworthy joint founder and senior director of Galsworthy, Ltd., left £29,259 (£29,002 net value).

STORM IN SCOTLAND

THE blizzard which struck northern and central Scotland over the week-end February 17-18 played havoc with the power lines of the North of Scotland Hydro-Electric Board, every available man being called out to deal with the situation. Considerable damage was caused to the main power lines from the Fannich scheme to the East Coast by ice which gathered on the lines, in some cases up to one foot in thickness, and weighed them down until they broke or faulted. These lines had to be patrolled, and by Tuesday night, February 20, linesmen were still at work repairing the havoc. The main Dingwall-Newmore line was twice put out of action.

The storm broke on Saturday, February 17, and from then until late on Sunday, when the Board were able to report that all major lines had been cleared, engineers and linesmen were continuously at work checking faults, repairing lines and restoring supplies. Trouble first started on the distribution line to Kinlochleven which showed a fault at Rannoch. Snow had blocked the road and it was unlikely that a passage could be forced through. The Crieff district linesman and his mate were sent from Lochearnhead in an attempt to repair the fault, but were unable to get through and were not heard of again until late on Sunday when they were reported safe in the Kingshouse Hotel.

Later in the evening the East Grampian line from Tummel Bridge over the Alyth Moor to Forfar broke down causing a blackout in Alyth, Blairgowrie, Pitlochry and neighbourhood. The Pitlochry supply was restored by taking power direct from the Tummel-Garry hydro-electric scheme, and to restore supply to Blairgowrie and Alyth power was fed back to Lunanhead and through the East Forfar lines at Alyth.

In the meantime, over on the west coast, Oban was blacked out when the wind blew down two transmission lines near Bridge of Orchy. The gale also disrupted telephone communications, and great difficulty was encountered in getting reports from the men on the spot. Eventually, communications were established in a roundabout way through the Board's Clunie power station. Linesmen from the Board's Oban office with men from Balfour Beatty and Co., worked to restore a supply to Oban by 1 p.m. on Sunday. Another line in the west, the one running from Clachan at the head of Loch Fyne to Dalmally also was put out of action by the gale.

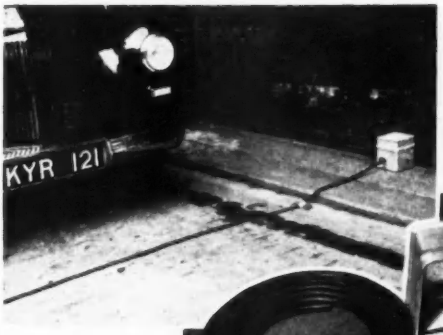
Frozen snow and ice which weighed down a 700 ft. span of the 33 kV transmission line from the Tummel Valley hydro stations to Speyside so that it became entangled in a treetop at Trinafour, caused a black-out at Kingussie and Newtonmore, but power was restored in about 20 minutes.

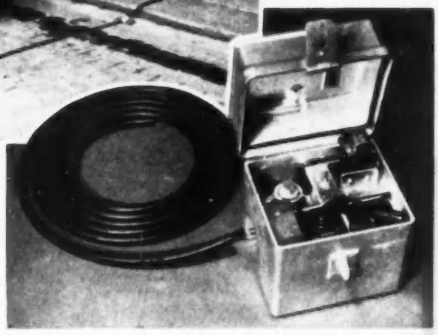
Ice and snow on the power lines on the slopes of Schiehallion caused a fault which interrupted the supply in Killin, Lochearnhead, Comrie, Callander, Dunblane, Killearn, Drymen and neighbourhood. Again this was overcome by re-routing the supplies while men toiled throughout Saturday and Sunday to repair the fault.

It says much for the skill, tenacity and endurance of the engineers, linesmen and others involved, that all the main blocks of consumers were receiving power supplies by 9 p.m. on Sunday.

COUNTING ALL CARS!

IN tackling problems of road widening, eliminating bottlenecks, and other aspects of highway planning and maintenance, a traffic census is an almost indispensable preliminary. In the past, this has often been carried out by observers, and the need has been felt for a simple and reliable automatic registering mechanism. Such a vehicle computer has now been developed by the W. R. Sykes Interlocking Signal Co., Ltd., and is being marketed by the Westinghouse Brake and Signal Co., Ltd.





General and close-up views of the "Sykes" vehicle counter and its operating tube

The actuating device is a flexible tube which is laid across the traffic lane, and fixed by special cleats. The weight of the wheels passing over this tube causes a puff of air to be transmitted to the counting mechanism. This, housed in a weatherproof case of cast aluminium consists of a diaphragm mechanism which, upon deflection, closes a contact that actuates a counting train, arranged to register one vehicle for every two impulses.

The counter is battery-operated, the batteries being self-contained. Sensitivity control is provided to respond to light or heavy vehicles, and it is stated that a high degree of accuracy has been obtained in use.

Work on the Nile

FORESIGHT in placing orders early for the plant and equipment needed, is the prime reason for the steady development of civil construction work on the Uganda hydro-electric scheme, which is now proceeding according to schedule and is expected to develop rapidly in future, it may be judged from the annual report of the Uganda Hydro-Electric Board for 1950. Orders for the equipment for the Owen Falls scheme were placed some time ago, as we recorded, and the first half of last year was spent on the detailed design of temporary works, in shipping out plant and in building up the labour force and supervisory staff. The access roads, offices, stores buildings, etc., have been largely completed.

The principal permanent work carried out during the year has been on the power station and intake dams. Considerable progress has been made on the rock excavation which is now well below water level. Due to the discovery of deep gravel beds in parts of the Victoria Nile it was decided to move the power station position 90 ft. further upstream. The Board has also accepted the contractor's offer for carrying out the concrete foundations for the remaining six turbines, four only being included in the original contract. The extra cost is given as £343,000. In regard to the main dam, model tests on the design of the sluices have confirmed that the consulting engineers' proposals were satisfactory. Good progress is also being made on excavation of rock at Ripon Falls and the construction of a temporary barrier to control the flow of the Nile.

The Board now has three temporary diesel generating stations in commission, with the completion of the new building at Mbale, in which three 220 kW and one 150 kW sets are installed. The Jinja "B" and the Kampala "B" stations were also completed during the year. The former, which has been renamed Njeru power station, has four 940 kW sets, and the latter now has an installed capacity of 4,510 kW. The old Jinja "A" station ceased operating on June 8 last.

A total of 54 miles of 11 kV line and 31 miles of 33 kV transmission line were erected, and the 66 kV line from Jinja to Kampala and a 33 kV line from Jinja to Tororo are under construction.

Altogether, over 13·8 million units were sold, an increase of 86·4% on the previous year's figures, providing a revenue of £147,536, from the revised tariff which operated from July 1. At the end of the year there were 5,298 consumers connected, but the Board hopes shortly to be able to quote definite tariffs to prospective large industries.

On the financial side, the Board increased its short-term borrowings at a low rate of interest, and the Government's £3,100,000 3½% inscribed stock 1966-1969 was heavily oversubscribed. By the end of the year the Board had received £1,764,113 as part of the proceeds of the latter.

New Literature

Applied Electric'ty

by E. Hughes, D.Sc. (Eng.), Ph.D., M.I.E.E.

TEXTBOOKS of Ordinary National Certificate and Part I, B.Sc.(Eng.) standard are reasonably plentiful, but justification for the addition of the volume under review comes from two considerations. Firstly, it is a continuation of a series of National Certificate course texts, of which Dr. Hughes is joint author, and will thus doubtless be valued by those students who have grown up with these books. The second reason is perhaps even more important. The subjects covered are approached in a simple, direct manner, and even the more complicated concepts are clearly presented. Here is a book to learn from, and to learn thoroughly. The whole design of the volume, with its summaries of important formulae and its carefully selected examples from recent examination papers, is aimed at helping the student, and it should succeed. It differs refreshingly from some text books, which seem to be written more as reference volumes.

Contents may be summarised briefly. Electrostatics and electromagnetics; d.c. machines; a.c. circuits, transformers, alternators and synchronous and induction motors; thermionics; illumination and, finally, the use of the *operator j*. Published by Longmans, Green and Co. Ltd., 412 pages, 7¼ in. by 4¾ in. Price 10s. 6d.

International Mercantile Diary and Year Book

THIS hardy annual again brings up to date vital information needed by exporters, in regard to the documents required in international trade. After a section covering Great Britain, every country in the world is dealt with in turn. An index and gazetteer provides easy reference, and is followed by the diary section and a collection of useful tables, ready reckoners, etc. As in past years, export offices will find this volume a mine of information. Published by Syren and Shipping, Ltd. 370 pp., 9½ in. by 7 in. Price 30s.

Protection of Transmission Systems Against Lightning

by W. W. Lewis

LIGHTNING, as the outstanding electrical phenomenon in nature, has been the subject of much speculation throughout the years, yet a proved theory of its cause and its mechanism is still lacking. To the transmission engineer this is of importance, since in countries where lightning is prevalent electrical systems must be provided with some form of protection, and that protection could be more surely designed if the mechanism of cloud discharges were clearly understood.

Professor Lewis sums up, in the volume under review, the recent history of the theory and the parallel development of the practice of protection. His long connection with lightning investigations in the United States has obviously enabled him to consolidate a wide knowledge of his subject, and a remarkably readable book has resulted. Five of the 11 chapters discuss basic details of lightning and of travelling waves. The rest of the book presents practical rules for minimising the effects of lightning on transmission lines, sub-stations and generating stations. Insulation co-ordination, protective apparatus and such techniques as Petersen coil earthing are described and evaluated against experience gained from field tests. Published by Chapman and Hall, 418 pages, 9 in. by 5¾ in. Price 64s.

Resistance Welding in Mass Production

by A. J. Hipperson, B.Sc.(Eng.) and *T. Watson*

RESISTANCE welding in its various forms is by now firmly established as an economical production process. The present volume seeks to present the technical basis of the method, and to extend from this beginning to the details of successful application in practical production set-ups. An admirable introductory section discusses the factors underlying the selection of a particular technique, and then separate chapters deal with spot, projection, seam and flash and butt welding. In each case the principles of the method are clearly set out and typical machines described, with particular reference to the electrodes and jigs required.

Later chapters deal in some detail with control equipment, machine settings, testing and inspection and costs. The volume, which includes a useful bibliography and some very handy tabular matter, should prove a valuable reference book in all production departments. Published by Iliffe and Sons, Ltd., 278 pages, 8½ in. x 5½ in. Price 21s.

Industrial Electrical Plant Maintenance

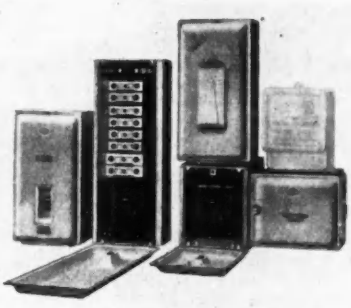
by E. G. Anness, M.I.E.E.

MANY books have appeared and will no doubt continue to appear, dealing with the maintenance of electrical machinery. The present volume can confidently be recommended as better than most. It deals principally with direct and alternating current motors and with their associated control gear; such plant as transformers and p.f. capacitors are touched on only briefly. In general, the author deals with the salient points of the machine under discussion and with likely faults and then tabulates likely faults against symptoms. Procedure for routine maintenance of each type of machine and control gear is discussed separately at some length, from a severely practical angle. Helpful additional chapters deal with bearings and insulating varnishes. Published by Pitman, 191 pages, 8½ in. by 5½ in. Price 27s. 6d.

The BUYER'S *Column*

"Memera"—A New Consumers' Control Unit

ANNOUNCED by the MIDLAND ELECTRIC MANUFACTURING CO., LTD., Reddings Lane, Birmingham 11, is a new range of consumer's control units designed to BS.1454/1948 under the family name of "Memera," which includes circuit-fuse units, main-switch units, and supply-intake units with service-cable sealing, chambers suitable for twin paper-insulated lead-covered cables or for 1¼ in. conduit.



Examples from the "Memera" range

There are also available composite units comprising 60 amp d.p. "Mem-ac" main switches with 4- and 8-way fusebanks. These composite units are contained either in steel cases finished cream or polished wood cases. Various combinations of fuse ratings can be supplied.

A special feature of all the "Memera" fusebanks is that they will accommodate either rewirable or H.R.C. cartridge fuse carriers. This interchangeability has been achieved without any other alteration being necessary. The cartridge fuse-links used are "Memcert" type which comply with BS.1361.

Price Increases

AN increase of 10% on certain domestic appliance list prices is announced by BRITISH NATIONAL ELECTRICS, LTD., Charlton, S.E.7. Products concerned are the BNE Charlton pressure, non-pressure and cistern type storage water heaters; Model F43, F101, F102 electric fires and all BNE tubular heaters, panel heaters and convectors. This increase is effective as from February 26.

F. C. BLACKWELL AND CO., LTD., Great Crosby, Liverpool 23, inform us that "Blaco" Conduit fittings will be increased by 10%.

This increase is on the consolidated price list No. 6. A further consolidated price list will be issued as quickly as possible and sent out.

Purely for Polishing

DESIGNED from the outset specifically for the purpose, the new polishing motors introduced by HIGGS MOTORS, LTD., Witton, Birmingham, are justly claimed by makers as some of the finest if not the finest units now being produced.

Incorporating type P.U. squirrel cage motors for two- or three-phase 200-250 V supplies, the machines have a pleasing symmetrical appearance. They are of the totally enclosed pattern with the exterior fashioned in such a way to avoid the incidence of dust and dirt retaining pockets and projections. Tapered end brackets are fitted, which serve the dual purpose of giving the greatest possible protection to shaft extensions yet affording the advantage of a large surface working area. Removable taper-screwed false noses are a standard fitting but if required parallel screwed ends, complete with clamp plates and nuts, can be fitted as an extra.

The machines are offered as pedestal or bench mounting units with a built-in push-button direct-switching starter and its attendant interconnection wiring. Prices range from £54 for the 2 h.p. bench-mounting unit to £90 for a 5 h.p. pedestal unit.

Higgs' pedestal polisher

Steriliser for Dairies by Stotts

AN efficient equipment which will be welcomed by dairymen everywhere is the new model dairy steriliser which has been introduced recently by JAMES STOTT AND CO. (ENGINEERS) LTD., Oldham, Lancashire.

The equipment comprises a galvanised steel cabinet fitted with a hinged door having an abestos packing and secured by four lever-type catches. Below the floor of the cabinet a boiler is housed, this being heated by immersion-type elements and automatically fed with water from a ball tank. In the connecting pipe a two-way valve is fitted so that the steam can be diverted from the cabinet to a churn steaming stool when this is connected to the apparatus. The valve is so arranged that in no position is it possible to close the steam pipe from the boiler. The boiler is fitted with an expansion pipe so that it is perfectly safe against the development of excessive pressure and is not subject to compulsory inspection for insurance.

Control of the heating is effected by three on/off

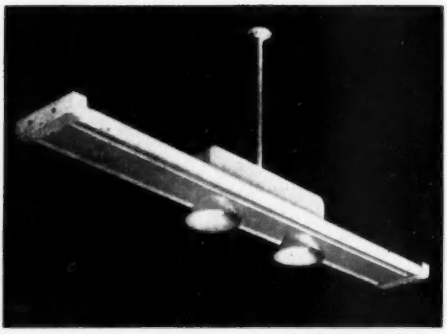
rotary switches, each switching one-third of the total load and the appliance can be wired to suit the various distribution systems in use.

The steriliser is made in three standard sizes as follows:—

Cat. No.	Cubic Capacity of Cabinet	Milk Bottle Capacity	Total Loading	Steam raised per hour (approx.)
DE 1	13 cu ft	120	6 kW	17 lb
DE 2	22 cu ft	240	9 kW	25 lb
DE 3	35 cu ft	360	12 kW	34 lb

Mazda Introduce Ballast Lamp Fitting

KNOWN as Catalogue No. F1032/2/4048, the new ballast lamp fitting, introduced by BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, W.C.2, offers a combination of fluorescent and tungsten lighting at a comparatively low initial cost. It houses two standard 40 W 4 ft. instant start Mazda fluorescent lamps with two special Mazda tungsten lamps of approximately 60 W each. The heating transformer is accommodated in a sheet-steel box in the centre of the fitting. The entire unit, basically a sheet-steel centre channel with die-cast end boxes, is finished in stone coloured stoved enamel with suspension by single-point conduit.

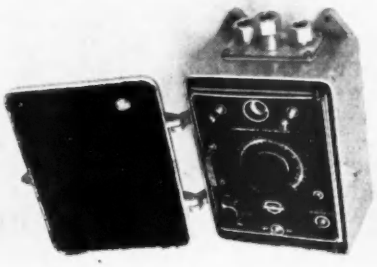


The Mazda ballast fitting Cat. No. F1032/2/4048

New Mullard Conductivity Controller

A NEW conductivity controller, Type E.7567, recently introduced by the Equipment Division of MULLARD ELECTRONIC PRODUCTS, LTD., Century House, Shaftesbury Avenue, London W.C.2, provides a convenient and sensitive method for controlling chemical or concentration changes in a wide variety of industrial processes. Among its varied applications are the automatic control of boiler water condensate, washing solutions, brine concentrations and the sodium hydroxide content in industrial solutions.

The controller operates on the same principle as the Mullard conductance bridge, Type E.7566. It employs a modified Wheatstone bridge network operating at a test frequency of 2·9 kc/s, and electrical process control is effected by use of an amplifier and relay circuit incorporated in the instrument. Arrangements are provided whereby a visual or aural warning may be given if the ionic concentration of the solution under control either rises or falls from a pre-determined value.



The Mullard controller

The conductance of the solution may be kept within specified limits by using the controller relay to add solute to the liquid as required. In addition, the actual conductance at any time can be quite simply observed by means of a magic eye balance indicator and a direct reading bridge dial located on the front panel of the instrument.

The whole instrument is mounted in a rigid cast aluminium case with a water-tight lid, and is finished grey "Dimenso" stoved enamel. The dimensions of the instrument are: height, 12½ in.; width, 9¾ in.; depth (from front to wall), 6½ in.

TRADE PUBLICATIONS

SAFETY HANDLAMPS.—Publication 2850 issued by NIFE Batteries Ltd., Redditch, Worcestershire, gives details of the Nife Safety Lamp Type G10, which has been approved by H.M. Inspector of Factories for use in atmospheres containing petroleum spirit.

WHOLESALING.—British Central Electrical Co., Ltd., 6-8 Roseberry Avenue, London E.C.1, have at long last issued their post-war catalogue. It is a volume for which engineers will most surely find room on their desks.

FESTIVAL LIGHTING.—This coming summer season will be a time when the new General Electric Co.'s brochure on the subject will prove invaluable. No. 1288 is available from Magnet House, Kingsway, London W.C.2.

FLUORESCENT LIGHTING.—New literature from Micramatic Ltd., Wootton Mount, Old Christchurch Road, Bournemouth, and Congleton, Cheshire, illustrates the ranges of cold cathode and window lighting.

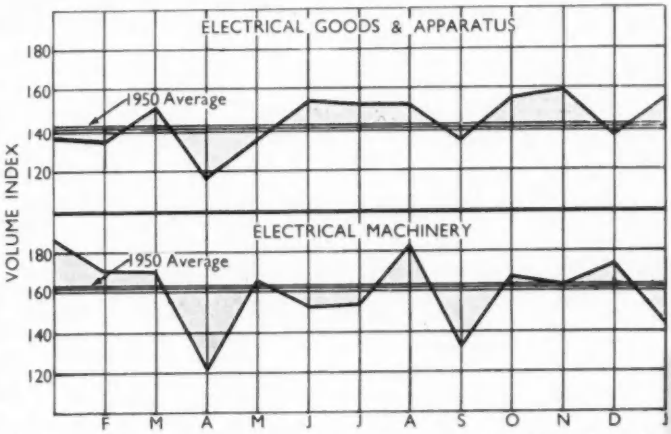
INTERCOMMUNICATION EQUIPMENT.—The "Soundmaster" intercomm. system is described in a leaflet available from Communications Systems Ltd., Strowger Works, Liverpool 7.

EXPORTS AND IMPORTS

EXPORT VOLUME INDEX

Electrical goods and apparatus up, electrical machinery down. That is the brief story of Britain's international electrical trading during January. The actual value of electrical goods, etc., exported was £7,742,007, 154% of the average monthly volume during 1947, when allowance is made for price changes.

The value of electrical machinery exported dropped to £3,528,233, and when this is modified to take account of changing values, it becomes equal to 142% of the 1947 average.



ELECTRICAL goods of all types exported during the month of January increased little above the December, 1950, figure; nevertheless the grand total of £11,798,875 is about £550,000 in value above the monthly average for 1950. In comparison with December exports, the most noteworthy increases during January were in respect of portable accumulators, cooking and heating appliances, insulating materials, electric motors and fans. In regard to the latter, complete desk and ceiling fans alone amounted to £85,174 in January. Likewise, complete vacuum cleaners exported in that month amounted to £205,023 in value compared with £73,610 in January, 1950.

Description	Exports Value Month of January			Imports Value Month of January		
	1949 £	1950 £	1951 £	1949 £	1950 £	1951 £
Telegraph and Telephone Wires and Cables—						
Submarine	49,237	41,097	35,921			
Other	536,070	737,660	641,258	3,629	30,589	13,301
Rubber Insulated	646,350	273,401	458,418			
Insulated, other than Rubber	1,100,897	811,621	947,578			
Wireless Apparatus, including Valves	940,084	757,798	1,184,166	77,636	112,459	270,063
Telephone and Telegraph Apparatus	1,333,108	1,256,287	1,442,324	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Bulbs and Discharge Lamps	133,661	124,836	129,028	11,809	23,656	13,847
Other Descriptions	512,574	327,557	350,115	5,203	33,211	37,150
Batteries (primary)	98,560	80,823	177,768	—	—	—
Accumulators, Portable	223,132	248,343	320,933	—	—	—
,, Stationary	46,254	37,919	35,534	—	—	—
,, Parts and Accessories	64,508	80,993	62,147	—	—	—
Electrical Cooking and Heating Appliances	314,979	309,482	327,522	—	—	—
Ammeters, Voltmeters, etc., and Parts	99,567	103,898	126,933			
House Service Meters	186,937	90,896	132,192	24,809	31,445	37,360
All Other Instruments	72,655	98,791	152,000			
Electro-Medical Apparatus	39,419	36,125	54,395	—	—	—
X-Ray Apparatus, etc.	131,102	88,167	128,051	26,363	19,603	24,701
Insulating Materials	190,873	159,062	193,126	—	—	—
All Other Articles	477,901	446,211	428,590	55,069	138,190	77,679
Total of Group	7,314,483	6,436,894	7,742,007	204,518	390,153	474,101
Electrical Machinery:—						
Generating Sets (Diesel)* —						
Not exceeding 200 kW		1,000,417	369,914			
Exceeding 200 kW	1,364,023	71,967	175,924	15,431	18,259	49,451
Other Generating Sets		221,169	328,360			
Generators minus Prime Movers, and Parts†		143,263	224,343			
Motors	1,009,616	777,818	843,934	42,542	49,003	23,630
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	1,454,978	2,010,186	1,585,758	8,413	13,053	6,770
Fans, Electrically and Power Driven	154,216	178,378	141,175	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	241,863	186,577	387,460	—	—	—
Total Appliances and Machinery	11,539,179	11,026,669	11,798,875	270,904	470,468	553,952

* 1950 figures include generators minus prime movers. † 1950 figures, for parts of generators only.

THE WEEK

COMMERCE *in news* INDUSTRY

B.E.A. Raises Bulk Supply Charges

AREA Boards have been notified by the B.E.A. that the cost of electricity will be increased as from April 1 and accordingly a revised tariff will come into force estimated to raise the overall cost of bulk supplies by about 2%. These adjustments will have varying effects on individual Boards but are entirely exclusive of any effect which the recent increase in coal prices may have.

The new tariff, applicable on a uniform basis to all Boards subject only to regional fuel cost adjustments, will incorporate a fixed charge per kilowatt of maximum demand and a running charge per unit consumed. The kilowatt demand charge has been raised by 7s. 6d. to £4 2s. 6d., but the running charge has been reduced to 0·33d. per unit as a result of economies in operating costs due to new and more efficient plant. The latter is subject to a coal price adjustment of 0·0007d. per 1d. variation in the price of fuel from a basic figure of 38s. a ton. The B.E.A. states that the demand charge has been increased because of a change in the basis of assessment, and the rising cost of new plant and equipment. It had also been decided to build up the statutory Central Reserve Fund out of the Authority's own revenues instead of relying on contributions from the Area Boards. Further details of the charges are given among our advertisements on page 41.

No P.T. on Projector Lamps

ELECTRIC filament lamps suitable for use in cinematograph projectors or in projectors for slides or film strips have been made exempt from purchase tax under an order published recently by the Treasury. The "Purchase Tax (No. 2) Order 1951" which exempts these lamps, came into force last Monday. The exemption applies to vertical burning projector lamps classified under Class A.1 and to exciter lamps under Class G of the schedule issued by the E.L.M.A. The amended paragraph in the Purchase Tax schedule will in future show the above lamps to be free of tax while tax on other filament lamps not exceeding 250 W and fluorescent lighting tubes under 80 W will be at 33⅓%.

Convention on Television

THE I.E.E.'s Radio Section is organising a Convention on "The British Contribution to Television," to be held towards the end of April, 1952. We understand that this date has been chosen to give authors ample time in which to prepare their papers and also to avoid a clash with the Joint Engineering Conference. The latter is to take place between June 4 and 15 this year and will include a session devoted to a survey paper on television. It is intended that the Convention will comprise discussion on a number of papers, supported by demonstrations and visits to appropriate organisations. A special sub-committee has been appointed to deal with preliminary arrangements and further details will be announced from time to time. The Convention will probably last five days.

New Iron and Steel Prices

INCREASES in the maximum prices of iron and steel came into force last week under the Ministry of Supply's Iron and Steel Prices Order, 1951 (S.I. No. 252). The new prices are another result of the recent increase in price of coal and coke. Some of the alterations which effect the industry are as follows:

	Price per ton	
	Old	New
	£ s. d.	£ s. d.
Pig iron (basic)	10 11 6	10 19 0
Tinplate and sheet bars	16 16 6	17 6 6
Wire rods	21 2 3	21 15 3
Plates	20 14 6	21 3 0
Cold rolled strip ...	33 0 0	33 12 6
Wire, mild	28 12 6	29 12 6

H.Q. Dispute Remains Undecided

THE B.E.A. has now bought the property on the Lower Lee estate, Woolton, which it was proposed should be converted into a permanent headquarters for the Merseyside and N. Wales Division. Whether or not the large house, consisting of four reception rooms and twelve bedrooms, will be converted into and used as the headquarters is still under consideration. Readers will recall that the Liverpool City Council objected to the use of the property as a

The First Half-Century

The British and Foreign Electrical Vehicle Company is exhibiting at the Royal Aquarium its latest racing car. This has the torpedo front and special wind deflecting wheel guards peculiar to the racing type and it is generally built on handsome lines. The car is designed to carry normally 59 Leecoll cells having a capacity of 270 ampere-hours. It is claimed that with these cells the car will run from 100 to 120 miles on one charge.—*From our issue of February* 28, 1901.

headquarters but, as reported in our issue of February 15, there was considerable confusion over the result of discussions at the Council's meeting. Following that meeting there was some doubt as to how the matter stood and although the definite step of acquiring the property has been taken its future use remains uncertain.

New Cable Laid in Iraq

RAPIDLY growing telephone services in and around Baghdad have naturally involved the provision of many new cables and automatic exchanges, a job which has been entrusted to British Insulated Callender's Cables Ltd. Cable laying has been carried out by the Iraq Post and Telegraphs Department but a team of specialists from this country, which has been out there since 1948, has supervised the jointing and testing. Latest job to be completed was the installation of a trunk telephone cable linking the new wireless transmitting and receiving station at Abu-Ghuraib with the broadcasting studio and central telegraph office in Baghdad. This is a distance of about 18 miles running through the busy streets of Baghdad, out across the desert and under numerous irrigation canals.

The double armoured cable employed consisted of 60 pairs/40 lb paper-insulated quad trunk and three screened pairs/40 lb conductor. It was divided into 14 full loading sections plus two half sections, one at each end, and each section comprised six drum lengths. Although the team toiled for a large part of the time in a temperature of 120°, not exactly conditions which are conducive to hard work, the team was able to complete the job well within the allotted time, in fact, four weeks ahead of schedule.

Metal Controls

STATUTORY effect has now been given to the Minister of Supply's statement on December 28, concerning the use of copper, zinc and their alloys in the manufacture of certain goods. The relevant orders are the Copper and Zinc Prohibited Uses (Board of Trade) Order 1951, and the Copper and Zinc Prohibited Uses (Ministry of Supply) Order 1951, and come into force today, Thursday. There are no alterations to the list published in our issue of January 4, but it should be noted that in two instances although copper and zinc cannot be incorporated, the articles may be galvanised or plated. These are ornamental lighting fittings, including table and standard lamps, and lighting reflectors, shades and suspension chains.

Dwindling Coal Resources

A MORE efficient use of coal was urged by Sir Claude Gibb, managing director of C. A. Parsons Ltd., when he addressed the Yorkshire section of

Laying the new Baghdad - Abu - Ghuraib trunk telephone cable in the suburbs of Baghdad. Left, members of the B.I.C.C. team testing the line during installation

the Institute of Fuel last week. The aim must be to achieve a 50% increase in average efficiency, he said, and it should be recognised that coal was a precious and dwindling chemical rather than a primary fuel. Sir Claude went on to say that as the nationalised industries—coal, gas, electricity and transport—were so dependent on coal, now was the time to integrate them. With those industries as one undertaking, in 20 years more power could be obtained from 120 million tons than we now got from 200 million. He warned his audience that at the present rate of consumption this country's coal resources would be exhausted in another 200 years.

E.A.W. Branch's Silver Jubilee

THE Glasgow branch of E.A.W. celebrated its silver jubilee recently and became the first of the Association's branches to reach this milestone. At the celebration dinner Lady MacColl, chairman of the Scottish Council and the branch's president, was in the chair. The toast of E.A.W. was proposed by Mr. John Henderson, chairman of the I.E.E. Scottish Centre and chief engineer of S.W. Scotland Electricity Board, and Dame Caroline Haslett replied.

Electrical Power Exhibition

EXHIBITS representative of some of the latest developments in the electrical industry are being shown at the Electrical Power Exhibition opened recently in the Royal Scottish Museum, Edinburgh and open until March 18. The displays have been arranged under the three headings of generation, transmission and application. Under the first named are models of generating stations, turbines, and wind power generators to be installed in the Orkney Islands and N. Wales. Models of the 132 kV switch house and 400 kV air-blast circuit breaker at Braehead power station have been included under transmission, while such exhibits as electrolytic polishing, arc furnace and television exemplify the latest developments in the use of electricity in industry.

South Midland I.E.E. Jubilee

REFERENCE has already been made (ELECTRICAL TIMES, February 6, p. 239) to the jubilee of the South Midland Centre of the Institution of Electrical Engineers. A souvenir booklet has now been issued giving a short account of the Centre's history.

The original petition for a Birmingham Local Section was presented to the Institution on June 25, 1900, the inaugural meeting taking place on February 27, 1901, with a membership of 110, and with Prof. Oliver Lodge as chairman. A higher degree of autonomy resulted in 1918, when the Birmingham Local Section became the South Midland Centre with direct representation on the I.E.E. Council, the chairman and immediate past-chairman becoming *ex officio* members of that body. Interesting points from the history are that in fifty years the Centre has only had five secretaries, and that its membership has risen from 110 to 3,000.

The jubilee is being celebrated by an exhibition of the development of engineering science and products during the half-century, which will be held in the Birmingham College of Technology in Suffolk Street from March 20 to 31, and will be open from 11 a.m. to 8.30 p.m. daily (excluding Easter weekend).

Piece-work Ban Ended

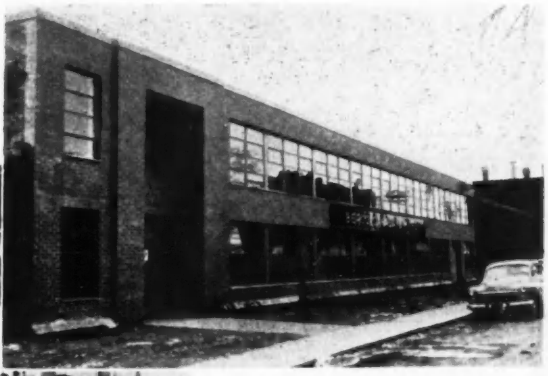
THE ban on piece-work by workers at the Metropolitan-Vickers factory in Trafford Park, Manchester, ended last weekend when the men decided to accept a recommendation of their shop-stewards to return to piece-work. The decision will allow the works committee to open negotiations with the management for revised rates. The ban has been in operation since mid-December in protest against the terms of the engineering industry wage award under which some men received no increase.

Commonwealth Apprentice Scheme

ENGINEERING graduates from universities in all parts of the British Commonwealth will be eligible to join a new scholarship scheme for apprentice training at the Brush A.B.O.E. group of factories. The scheme, announced by the Group's chairman Sir Ronald Matthews recently, will allow for two years' study of the products and methods of production in the factories. During the first twelve months the course will provide a general training in basic manufacturing procedures, and in the second half of the course the apprentice will move from

Sir John Mackay Thomson, Prof. Sir Alexander Gray, Sir Norman Duke and Dr. D. A. Allan inspecting one of the exhibits at the Electrical Power Exhibition in Edinburgh (Photo: Scotsman

New premises, doubling previous accommodation, have been completed by Bepco (Canada) Ltd., in Toronto. Our photographs show (right) the exterior of the building seen from Niagara Street with the old workshops on the extreme right. Below is a view of the new workshops



factory to factory gaining more specialised knowledge. Only applicants who have graduated with honours degrees at a recognised university will be considered, and preference will naturally be given to those whose studies have included both mechanical and electrical engineering. Free return passage from the apprentice's home will be provided. This new scheme will provide an excellent opportunity for students to gain valuable experience which will undoubtedly prove valuable to the Commonwealth, particularly in the under-developed areas. Besides these practical advantages, the Group's enterprise will be an added fillip in strengthening the ties between Britain and the Commonwealth countries.

Electrician's Mate—Which Union?

MANY electricians in the northern sub-area of the London Electricity Board went on strike last week. The trouble arose at Bethnal Green where a labourer in the Board's service, who is a member of the Transport and General Workers' Union, replied to an advertisement for an electrician's mate and was given the appointment. Seventeen electricians in the Bethnal Green district, who claimed that the new mate should transfer his union membership to the E.T.U. have been on strike since February 14. But the man's union is not willing for the transfer to take place. The Board maintained that the man should be free to belong to either of the unions, and point out that the T. and G.W.U. is one of the five unions constituting the N.J.I.C. for the electricity supply industry. By Monday, 836 men on the Board's contracting staff were on strike.

A Machine to aid the Deaf-Blind

AS a result of a short time spent in hospital during which his companion was a man blinded in a bomber crash, Mr. A. R. Cooper, controller of the Merseyside and N. Wales Division, has invented a machine whereby a conversation can be carried on with a deaf-blind person. The machine, we understand, resembles in looks and size a portable typewriter. The speaker presses alphabetical keys on one side and the deaf-blind person opposite keeps his fingers in six apertures. By a series of electro-magnets, plungers bring braille lettering against the fingertips, so that someone unfamiliar with braille can type the English lettering and have his words translated into braille. The invention has been used at the Liverpool Deaf-Blind Institute and Mr. Cooper hopes to be able to take it to his former hospital companion who is in Southampton. If it is developed the machine will undoubtedly be welcomed by the 3,000 or more deaf and blind people in the country and do much to lessen the hardships of the "loneliest people in the world."

The Missing 3,000

AVERAGE attendance at meetings of the I.E.E.'s London Students section during the first half of the present winter session was 111. While the committee was pleased to note the improvement over the whole of last winter when attendance at ordinary meetings was only 64, it was nevertheless perturbed that it was still so low. We understand that the total membership of the section is over 3,500.

After Working Hours

FIRM believers in the old saying that all work and no play makes the electrical engineer a dull boy, we relax for a few minutes to take a glimpse into the leisure hours of the industry. Starting at Greenwich we note that Telcon's Social and Athletic Club held their annual presentation

Directors with the Mayor of Salford at the celebration dinner-dance of Dorman and Smith Ltd., who, as reported last week, commemorated the 70th anniversary of their foundation. From left to right are: Major R. Amberton, director; Ald. E. A. Hardy, M.P.; E. L. Cooper, deputy chairman; the Mayor of Salford; C. M. Nesbitt, director; Thomas Atherton, chairman, and M. L. Cooper, director

concert recently. A 45-minute variety concert was followed by the award of prizes to winners of all indoor and outdoor games. Long service certificates were awarded to 24 employees who had completed 15 years' service, and five other workers received certificates and Westminster chiming clocks after 25 years' service.

Nearby, at Charlton, the Siemen's Players chose *On Monday Next* for the second play of their winter season. After performances to fellow workers the players visited the Royal Herbert Hospital at Shooters Hill.

Away from London and into the provinces we note that F. D. Newcombe and Co., Ltd. held a staff party recently at Peamore House Hotel, Exeter. The occasion was the silver jubilee of the firm's formation. Mr. Newcombe, director and founder, was given a gold cigarette case by his co-directors and staff to commemorate the occasion.

Factory to be Built in Waterford

A DISUSED horse-racing establishment in Waterford has been selected as the site for a large factory for the manufacture of electrical machinery. Sponsored by the A.C.E.C. the factory is claimed to be the largest of its kind in Eire. The first building will cover an area of about 2,500 sq yd and is expected to be ready for production next year. As the business expands, other buildings will be erected on the 35-acre site. We understand that all kinds of electrical products will be made, including such goods as transformers, generators, motors and switchgear, and it is planned to build up a large export trade. Three Irishmen are already training in Belgium and will return for the installation of plant. The clearing of the site is expected to begin within the next few weeks.

Windsor Castle to be Floodlit

SOME time ago the proposal to floodlight Windsor Castle during the Festival of Britain was rejected on the grounds of economy. We are pleased to be able to report, however, that the British Thomson-Houston Co. has undertaken voluntarily to install a suitable scheme of illuminations for this historic castle at their own expense. This will be a contribution from the company towards the year's festivities, and the scheme will be in operation at limited times throughout the festival months.

NEWS IN BRIEF

The sum of £275 was contributed towards E.I.B.A. funds as a result of the first annual ball organised jointly by the Association's Hants and Dorset branch and the Southern Division of B.E.A. The ball was held at the South Parade Pier, Southsea.

A contract for 20,000 yd pre-impregnated paper insulated cable for the Sydney County Council has recently been obtained by Messrs. W. T. Glover and Co., Ltd.

The South Shields Transport Committee is to appoint a Joint Consultative Committee to see what economies can be made in the running of the town's trolley buses.

The annual dinner of the Cromptonian Association will take place at the Trocadero Restaurant, Piccadilly, on June 1.

Figures issued by the Northern Regional Board for Industry show that from September 1, 1950, to January 26 this year, load-shedding in the area had taken place on 39 days compared with 62 days during the previous winter.

The 56th Royal Netherlands Industries Fair at Utrecht will take place this year from April 3 to 12. Export days will be April 3 and 4. Representative for the U.K. is Mr. W. Friedhoff, at 10 Gloucester Place, W.1.

London Midland Region of B.R. plans a speedier disembarkation at Holyhead for this summer by means of electrically operated steel platforms and staircases which can be adjusted to tide level before the arrival of ships from Ireland, enabling passengers to disembark by straight instead of sloping gangways.

Lancashire Dynamo & Crypto Ltd., are providing 180 h.p. motors to drive compressors cutting the first tunnel in the Australian Snowy Mountains hydro-electric scheme.

Questions in Parliament

American Coal

Replying to a question by Col. Clarke, the Minister of Fuel and Power said that the American coal supplies to our power stations compared well with British coal in ash content, volatile and calorific value.

Coal For Power Stations

When Lt.-Com. Hutchinson asked for an assurance that sufficient coal would be made available to keep all power stations in Scotland in full operation, the Minister of Fuel and Power emphasised that such fuel supplies were fixed throughout the country by reference to the estimated full consumption requirements and stock position at the stations.

Electric Fires on H.P.

The President of the Board of Trade was asked if he would extend the provisions of S.I. No. 39, 1950, which restricts hire purchase credit facilities for price-controlled goods, to electric fires. Mr. Wilson stated that domestic heating appliances were included in the current review of those price controls on goods which had been withdrawn since the war. If, as a result of the review, statutory price control was reimposed on electric fires, the provisions of the Hire Purchase Order made under the Price Control Act of 1941 would again automatically apply to them.

Festival of Britain (Electricians)

Mr. Osborne asked why the extra 2d. per hour now paid to electricians working on the Festival of Britain site was not paid when originally demanded, which would have avoided the strike; and whether their work was being done on a cost-plus basis? Mr. Morrison explained that the claim of the electricians was one for settlement between both sides of the industry. There were no cost-plus electrical contracts.

H.E. Projects

Replying to a question by Mr. Amory about water power supplies in view of a long-term shortage of coal, the Minister of Fuel and Power stressed that the B.E.A. had under consideration a number of hydro-electric projects of small and medium size, and investigations were proceeding to see whether they would be economically sound.

Honduras Development

As part of the recent developments in British Honduras, an investigation was being made of the hydro-electric possibilities in the Stann Creek and Belizeo areas, Mr. J. Griffiths announced in reply to a query by Mr. Hynd as to progress on recommendations of the Evans Report.

New Power Stations

The Minister of Fuel and Power was asked by Mr. Fletcher what departments were consulted when it was proposed to build a new power station, both from a point of view of defence and accessibility of coal supplies. He answered that before applying for sanction for such projects, the B.E.A. investigates relevant matters with the N.C.B. and the Railway Executive. He, too, discusses such matters with colleagues who are concerned.

Severn Barrage Model

When Mr. P. Freeman asked when the tidal model of the Severn Barrage power scheme would be completed, Mr. H. Morrison said work on the new research station had been delayed, but the model should be finished in 1953 or early 1954.

Scottish Power Supplies

Asked what proportion of the power in the national grid was derived from the North of Scotland Hydro-Electric Board, and for cost of generation in comparison with steam stations. Mr. Noel-Baker said 4,464,500 units were supplied by the Board during the last week for which data was available—equal to 0·36% of the total grid supplies. The price at which power is sold to the grid is fixed by the 1943 and 1947 Acts.

Uganda Board

The Secretary of State for Colonies was asked to define the relationship between the Government of Uganda and the Uganda Electricity Board; and what provision was made for African representation on the Board. Mr. Griffiths replied that the Board was appointed by the Governor in Council, and had statutory powers and duties defined in the 1947 Ordinance. Members were appointed for their personal qualifications for the work and not to represent particular interests.

Yorkshire Board's H.Q.

In a written reply to a query by Mr. Kaberry, the Minister of Fuel and Power revealed that the Yorkshire Electricity Board had spent £78,178 on work at their Scarcroft premises which should have been licensed. Licences for only £39,250 had been issued. It is understood that a question on the matter has been tabled in the House, and is probably to be the subject of the adjournment debate next Tuesday, March 6.

Supply Lines Interference with T.V.

When the attention of the Postmaster General had been drawn to the interference with television reception in the Kelvedon area, Essex, he said that investigations had shown that the trouble was due to nearby h.t. electricity supply lines and the Electricity Board concerned was doing all it could to minimise the difficulty. But interference with television reception from adjacent h.t. supply lines, due to weather conditions and variations in the load carried, was a general problem to which no complete solution had yet been found.

Television Station—Newcastle

The five-year plan of the B.B.C. provided for a television station to be opened in the Newcastle area before the end of 1954, Mr. Ness Edwards stated in a written reply.

Electric Supply News

Belfast

The Corporation Electricity Committee has decided to accept an offer of the Harbour Trustees of a lease of 13 acres of land at the West Twin Island, at an annual of £200, as the site for the new power station.

Dingwall

After hearing representatives of the Scottish Gas Board and the North of Scotland Hydro-Electric Board, Dingwall Town Council has decided to allow prospective tenants of council houses to choose whether they want gas or electricity installed for cooking. There will be no charge for laying gas mains. By agreeing to give the tenants a choice the council will be called upon to pay £266 instead of £800 towards the cost of the electric mains.

Edinburgh

The new 60 MW turbo-generator at Portobello power station is now on load, it is reported. It is hoped to have a second set in operation by 1953-4.

The disapproval of Edinburgh Corporation to the erection within the city boundaries of overhead cables leading to the Lady Victoria Colliery, Newtongrange, is to be brought to the notice of all Scottish M.P.s. They are to be asked by the city planning committee to raise the matter in the House of Commons.

Isle of Man

A resolution is to be moved in Tynwald, asking the Government to approve the provision of the sum of £76,450 for taking electricity supplies to farms.

London

The London Electricity Board proposes to construct transforming and switching station, workshops and stores at 239-251 Southwark Bridge Road and at 93-97 Lancaster Street, Southwark.

Marchwood

Further details of the B.E.A.'s proposed new generating station for Marchwood, near Southampton, were given at the recent meeting of the New Forest R.D.C. Plans are for the installation of eight 60 MW turbo-alternators and eight 550 klb/hr boilers, together with auxillary equipment. The station is to be served by colliers of up to 4,500 tons, bringing seaborne coal which will be unloaded by grab cranes. Ash and dust will be handled by water sluicing and pumping plant to impound areas for settling and reclamation of the mudlands.

Merseyside

The Merseyside and North Wales Electricity Board proposes to increase the price of electricity by one-tenth of a penny a unit as from the first meter reading after April 1, the Area Consultative Council was told last Thursday. The increase applies to those tariffs which do not include a coal clause, and in which the price is now less than 4d. a unit for lighting and composite rates, or less than 2d. for power.

Neath

The borough and rural district electricity supplies are to be reorganised, modernised and developed at a total cost of £250,000. The project is designed to improve and extend existing services and includes the laying of new h.t. and l.t. underground and overhead cables in the town and rural area, the building of a number of new substations and the provision of two new 30,000 V cables for Tir John to provide for an anticipated consumption of 62,000,000 units a year when the refineries extensions are in operation. The major project is expected to take at least two years to complete.

Northern Ireland

The Electricity (Supply Amendment) Bill to extend the borrowing powers of the Electricity Board for Northern Ireland from £10 million to £20 million was introduced by the Minister of Commerce last week.

LIGHTING SCHEMES

Carlisle.—The lighting committee has recommended the installation of fluorescent lighting in English Street.

Chichester.—Borough surveyor to prepare scheme for improved street lighting.

Horbury.—The Council's scheme for installing electric lighting along the section of the Huddersfield-Wakefield Road, has been approved by the Ministry of Transport.

Leatherhead.—The Council is considering the provision of electric street lighting in part of Epsom Road, Ashstead.

Queensbury and Shelf.—The U.D.C. is to prepare a scheme for sodium lighting in various roads.

Royston.—U.D.C. to prepare a scheme for lighting of Melbourn Street.

Ruislip-Northwood.—The U.D.C. is to spend £57,000 on converting street lighting to electricity.

South Shields.—An illuminations scheme for the sea front, costing £10,000, is being proposed.

Thurrock.—The U.D.C. have prepared schemes for improved street lighting, costing approximately £21,000.

Towcester.—Forty-two fluorescent lamps are to be installed in Watling Street, not 24.

Warwick.—T.C. has under consideration the question of improving street lighting in the town.

Wigan.—The sum of £7,488 is allocated in the 1951-52 estimates for the installation and conversion of street lighting.

Yeovil.—The Council is to seek authorisation from the Ministry of Transport to carry out their 1951-52 electric street lighting scheme, which will cost £6,000.

Company Activities

Clarke, Chapman & Co.

Trading profit for 1950 amounted to £450,739, compared with £498,392 in 1949, plus other income, making a total of £463,451 (*£509,196*). Provision for depreciation £33,125 (*£35,744*), reserve for replacements of fixed assets and tax on initial allowances £40,000 (*£30,000*), deferred repairs £23,736 (*nil*), written off patents nil (*£10,365*), directors fee and emoluments £28,743 (*£34,814*), pensions contributions £14,903 (*£32,636*), taxation £144,436 (*£193,539*), leaving a net profit of £178,508 (*£172,098*). To pensions reserve £20,000 (*nil*), general reserve £25,000 (*same*), research and development reserve £20,000 (*£30,000*) and dividend equalisation reserve £15,000 (*£50,000*). To Preference dividend £4,890 (*same*), Ordinary 15% (12½%) £72,000 (*£65,000*), leaving a balance of £78,399 (*£56,781*) carried forward. Current assets are listed at £1,234,111 and current liabilities and provisions £710,616.

English Electric Co., Ltd.

The complete report for 1950 shows a group net profit of £1,101,022 as compared with £730,268 in 1949. The final Ordinary dividend is increased to 11%, making 15% (*10%*). Provision for taxation amounts to £1,896,328 (*£1,045,625*), and for depreciation £848,818 (*£678,241*). In recommending the increased final dividend the directors have had regard to the fact that as a result of the extension and improvements of its manufacturing facilities provided in recent years, both the company's output and earnings are amply sufficient to support this rate of dividend in normal trading conditions in the foreseeable future. In the consolidated profit and loss amount, the provision for contingencies amounts to £50,000 (*£110,000*), and to the depreciation equalisation reserve £55,000 (*£93,323*), with £173,470 (*£38,486*) for interest on loan capital. In the report, current assets are listed at £4,991,953 (*£4,875,944*) of which £2,073,676 is in respect of land and buildings, £2,638,753 for plant and machinery, £207,401 for furniture, fittings and equipment, and £72,122 for trade investments. Current liabilities total £11,452,780.

A. H. Hunt Ltd.

For 1950, the profit after allowing for all charges, including taxation, amounted to £55,917, an increase of £33,353 over the preceding year. Taxation absorbed £66,606 (*£33,000*), and there is a provision for future tax of £13,700 (*£7,000*). Final Ordinary dividend is 17½% (*15%*), making 25% (*22½%*).

Keith Blackman and Co.

The directors propose to raise an additional £50,000 of capital by the issue of 100,000 10s. Ordinary shares at par to holders, in the ratio of one for five.

Marconi's Wireless Telegraph Co.

Profit of the company and its wholly-owned English subsidiaries for 1950 was £164,309 (*£143,331*). The Ordinary dividend is again 7%. £82,582 is set aside for taxation and £52,141 for depreciation and there is £186,171 carried forward. Current assets total £6,826,606 (*£6,284,365*), against current liabilities of £2,852,414 (*£2,407,312*).

National Plastics

A consolidated trading profit of £125,559 for the 53 weeks to September 30 last is recorded by this concern which was formed to acquire and amalgamate the undertakings of British Moulded Plastics—formerly De La Rue Plastics—and Moulded Products, Ltd. This figure compares with £94,348 for the previous year. After allowing £45,880 (*£46,355*) for depreciation, and £45,672 (*£29,321*) for taxation, the group net profit is £30,999 (*£11,099*), of which £17,200 relates to minority shareholders. To subsidiary's revenue reserve nil (*£6,126*), leaving £3,008 carried forward (*debit £10,791*).

Richardsons, Westgarth & Co.

Subject to the consent of the Capital Issues Committee, it is proposed to issue new capital. A meeting is to be held on March 13, to raise authorised sum to £1,600,000.

Scophony-Baird Ltd.

In a report on interim progress, Lt.-Gen. Sir Charles J. S. King, chairman, states that preliminary estimates show a trading loss between April 1 and September 30 last of approximately £58,000, in addition to which it now seems clear that it will be necessary in due course to write down certain items of stock and work in progress to a considerable extent. It is therefore doubtful whether final results will show any improvement on those for last year. The cash position has now been improved by the sale of the Wells factory on a satisfactory basis. The economies to reduce losses foreshadowed at the annual meeting have been made, although these will take time to reach their full effect. There was a long and arduous road to travel before success could be achieved but the board felt that the first essential steps had been taken.

Dividends Declared

General Engineering Co. (Radcliffe) Ltd. Dividend 30% (*20%*). Profit for the year to November 30 was £33,516 (*£27,317*).

Marconi International Marine Co. Final Ordinary dividend 7½% (*5%*), making 10% (7½%). Group profit for 1950 was £111,702 (*£60,000*).

Mather and Platt, Ltd. Final dividend of 6% plus Jubilee bonus of 2½% on capital increased by 50% scrip bonus. Net profit £360,540 (*£288,267*).

Ransome and Marles Bearing Co. Interim dividend of 7½% (*same*), payable on March 21.

Richard Johnson Clapham and Morris. Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Mar. 3.—Irlam U.D.C. Electric lamps included in list of annual supplies required for year beginning April 1. Engineer and Surveyor, Council Offices, Irlam, nr. Manchester.

Mar. 3.—Maesteg U.D.C. Electric wiring of 64 houses on Turbeville housing site. Engineer and Surveyor's Dept., Talbot St., Maesteg.

Mar. 3.—Rochester. Lighting of Cavendish Rd. is part of road works to be carried out there. City Surveyor, 66 Maidstone Rd., Rochester.

Mar. 3.—St. Austell (Corn.) R.D.C. Electrical work at "Traverna" in the conversion to offices. Council's Engineer is R. J. Goodwin. Deposit £3 3s.

Mar. 5.—S. W. Durham. Hospital Management Committee invites tenders for supply of electrical equipment during the year beginning April 1. The Supplies Officer, General Hospital, Bishop Auckland.

Mar. 5.—Lancashire. Electrical installation in old people's hostels at Hindley, Huyton, Middleton and Nelson. Also in 10 houses at Hindley. Applications by the above date to County Architect, G. Noel Hill, County Offices, Preston. Deposit £2 for each job.

Mar. 5.—Littlehampton U.D.C. Electrical installation in 18 houses and 16 houses, under separate contracts on Wickbourne estate. Engineer and Surveyor, Council Offices, Littlehampton. Deposit £1 1s.

Mar. 5.—Staffordshire. Education Committee invites applications from contractors wishing to be placed on official list for carrying out electrical repairs and installations in schools. Names to Divisional Education Officer, 23 St. James's Rd., Dudley, Worcs.

Mar. 5.—Stockport and Buxton. Hospital Management Committee requires supply of electric lamps. Supplies Officer, Admin. Offices, 59b Shaw Heath, Stockport.

Mar. 5.—West Tyrone. Hospital Management Committee requires supply of electric lamps for year ending Mar. 31, 1952. Secretary of Committee, Tyrone County Hospital, Omagh.

Mar. 6.—East Riding. Supply of electric lamps required. Supplies Officer, County Hall, E. Beverley.

Mar. 7.—Dalkeith. Electrical work in 44 houses at Peaseflat. Documents from the Surveyors, Morham and Brotchie, 29 Hanover St., Edinburgh.

Mar. 7.—Dublin. Two complete sets of rectifier equipment, having output of 1,000 amp at 500 V. Also supply of one 400 kVA transformer for Port and Docks Board, Engineer's office, East Wall Rd., Dublin.

Mar. 7.—Edinburgh. Electric light and power installation in primary school at Old Saughton. City Architect, City Chambers.

Mar. 7.—Lewes T.C. Supply of cooker switches and hot plates wanted for year ending Mar. 31, 1952. Borough Surveyor, Town Hall.

Mar. 9.—Bournemouth. Installation of No. 2 electric lifts at Town Hall. Borough Architect, Town Hall. Deposit £2 2s.

Mar. 9.—Chester. Electrical installation and wiring of Two Stream infants' school at Blacon. Applications to be lodged by above date to City Engineer and Surveyor, Municipal Offices, 43 Northgate St., Chester. Deposit £2 2s. (Advertised in this issue.)

Mar. 9.—Dublin. Electrical installation at Post Office Stores, Infirmary Rd. J. Tyrrell, Secretary, Office of Public Works. Deposit £1.

Mar. 9.—Kilwinning T.C. Tenders invited for street lighting of Trunk Road A.78 with sodium vapour discharge lamps. Burgh Surveyor, Council Chambers, Kilwinning. (See Feb. 15 issue.)

Mar. 10.—Brighouse T.C. 130 concrete columns, 20 brackets for attachment to existing poles and 150 h.p. m.v. lanterns and fittings, for the Bradford-Huddersfield Road A.641. Borough Engineer, Commercial Street, Brighouse. Deposit £1.

Mar. 10.—Keighley T.C. Fluorescent lighting of public abattoir, Hard Ings Rd. Abattoir Superintendent, Health Dept., Lowfield House, North St.

Mar. 10.—Mablethorpe and Sutton U.D.C. Supply and erection of vertical spindle centrifugal pump driven by electric motor. Pump must be capable of lifting 20,000 g.p.h. Consulting Engineer, Silcock and Simpson, 10 Park Row, Leeds 1. Deposit £5.

Mar. 10.—Sunderland T.C. Electrical installation in 346 houses on Hylton Red estate. Borough Architect, Grange House, Stockton Rd. Deposit £2 2s.

Mar. 12.—Belfast. Two electrically heated food trolleys required for Royal Victoria Hospital by N. Ireland Hospitals Authority. Documents from the Hospital's Purchasing Officer.

Mar. 12.—Dublin. One 100/6G rectifier bulb for Hewittic mercury arc rectifier. Tenders to City's Vocational Education Committee, Town Hall, Merrion Rd., Ballsbridge, Dublin.

Mar.12.—Macclesfield. Hospital Management Committee invites tenders for supply of electric lamps and fittings for year ending Mar. 31, 1952, to hospitals in their group. Applications to Secretary, The Macclesfield Hospital West Park Branch.

Mar. 12.—Manchester. Electrical installation in Hollyhedge Rd. branch library, Wythenshawe. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

Mar. 13 — Newcastle-under-Lyme T.C. Supply and installation of lanterns, lamps and control gear, plus concrete standards for approx. ¾ mile in Bradwell Lane. Sodium discharge lamps, 140 W horizontal burning, are specified. Borough Engineer and Surveyor, Lancaster Building, Newcastle, Staffs. Deposit £2. (Advertised in this issue.)

Mar. 14.—Rowley Regis (Staffs) T.C. Supply of electricians' requisites for year beginning Apr. 1. Tenders to R. Hegan, Town Clerk, Municipal Bldgs., Old Hill, Staffs.

March 15.—Belfast. S. Belfast Hospital Management Committee requires supply of electrical engineering materials to Belfast

City, Musgrave Park and Malone Place Hospitals for year ending Mar. 31, 1952. Supplies Officer, Belfast City Hospital.

March 15.—Southampton. Electrical installation in Beech Ave. junior school. Applications to Borough Architect by Feb. 28. Deposit £5. (See Feb. 22 issue.)

March 16.—Belfast. Tenders invited for 6·6 kV and lower voltage cabling, with ancillary works. Electricity Dept., East Bridge St., Belfast. Deposit £2 2s. (See Feb. 22 issue.)

Mar. 16.—Cannock U.D.C. Supply, erection and installation of street lighting along (*a*) trunk road A34, 92 140 W sodium and ten 80 W fluorescent; (*b*) Class 1 A460, 19 140 W sodium and three 80 W fluorescent; (*c*) Class 2 B5013, 37 140 W sodium and five 80 W fluorescent. Council's Engineer and Surveyor, E. Lomax, Council House, The Green, Cannock. Deposit £5 5s.

Mar. 16.—Norton R.D.C. Electrical installation in 10 houses in Rillington. Council's Architects, Anderson and Allen, 32 Nicholas St., Scarborough.

Mar. 16.—Hawick T.C. Electrical installation in erection of a block of six houses in Gladstone St. Office of Burgh Surveyor, Hawick.

Mar. 22.—Cuckfield (Sussex) R.D.C. Installation of electricity in existing council houses on seven different sites. Engineer and Surveyor, A. Hutchings, Rural Council Offices. Deposit 10s. 6d.

Mar. 23.—Coventry. Electrical installation in primary school at Alderman's Green. Applications to Consulting Engineers, Brandt and O'Dell, Grosvenor Gardens House, London S.W.1, by Mar. 2. (See Feb. 22 issue.)

Mar. 24.—Bradford. Supply and installation of new switchgear and wiring at Dumb Mills, Frizinghall, and dismantling and removal of redundant portions of existing switchgear. City Engineer and Surveyor. Deposit £2 2s. (See Feb. 22 issue.)

No date stated.—Rothwell (Yorks) U.D.C. Wiring for electricity of 49 houses at Methley. Housing Manager, Civic Bldgs., Rothwell, Leeds.

No date stated.—St. Andrews T.C. Electrical work in erection of 36 houses. Applications to Architect, J. C. Cunningham, 10 Alexandra Pl., St. Andrews.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Mar. 14.—India. Supply of winding and resistance wires wanted by Director General of Industries and Supplies, Shahjahan Rd., New Delhi. B.o.T. (Ref. CRE (IB) 54276/51)*.

Mar. 15.—Morocco. Administration Internationale de la Zone de Tangier, require supply of eight tons of hard copper cable of high conductivity for extension of distribution grid. B.o.T.(Ref.CRE(IB)52836/51)*.

Mar. 19.—New York. U.N. at Lake Success requires programme monitoring exchange system. B.o.T. (Ref. CRE (IB) 53126/51).*

April 2.—Uruguay. Usinas Electricas y Telefonos del Estado require supply of 100,000 metres of double copper conductor for use in crossings of principal distributions of telephone centres. B.o.T.(Ref.CRE(IB)53682/51)*.

Apr. 6.—Brisbane. City Council invites tenders for 1,500 yds 0·50 sq in. single-core, 11,000 V, paper insulated, lead covered cable. Town Clerk, City Hall, Brisbane.

Apr. 11.—Uruguay. Administracion General de las Usinas Electricas y los Telefonos del Estado invites tenders for subtransforming stations and accessories for extension of "Western Circuit" as far as Rosariozone. B.o.T. (Ref. CRE (IB) 54078/51)*.

May 15.—Wellington (N.Z.). State Hydro-Electric Dept. requires supply of following: 36 miles of steel cored aluminium conductor; 550 sets of tapered armour rods with 1,200 ferrules; 7 armour rod wrenches with dies; 7 ferrule presses with dies; 2 hydraulic compressors with dies; 20 comealongs; 10 cable grips; 60 straight compression joint assemblies; 60 dead-end compression assemblies; and 30 repair sleeves. Stores Manager, Wellington C.1.

June 5.—Wellington (N.Z.). Five 410 kV switchgear and steelwork for the Waitaki power station required by State Hydro-Electric Dept.

June 12.—Wellington (N.Z.). State Hydro-Electric Dept. invites tenders for 400 V switchgear for Whakamaru power station.

CONTRACTS PLACED

Stoke-on-Trent T.C. Supply and erection of 281 lamps and columns on main road between Longton and Goldenhill, General Electric Co., Ltd., £13,465.

Torquay. Council has accepted alternative tender of Yeldon and Gardiner in revised sum of £3,326 for electrical installations to 94 houses on Marldon Rd. estate.

Your Queries — Answered

"Washwell" washboilers, makers of? T.E.—Hogan and Wardrop, Ltd., 47 Caledonian Rd., N.1. (19461)

"Rotoscythe" lawnmower, makers of? C.C.—Power Specialities, Ltd., Rotoscythe Works, Bath Rd. West, Slough. (19466)

"Duraplug" rubber plugs, makers of? G.B.—W. W. Haffenden Ltd., Richborough Rubber Works, Sandwich, Kent. (19469)

"Pearl" kettle, makers of? W.B.—Pearl Industries Ltd., Birmingham Factory Centre, King's Norton, Birmingham. (19476)

"Luxolight" fluorescent fitting, makers of? T.B.—We presume this reader refers to the "Luxolite" cold cathode fitting made by the Franco-British Electrical Co., Ltd., 15 King St., S.W.1. (19479)

"Sound Mirror" recorder, makers of? E.B.—Thermionic Products, Ltd., 7 Pratt Walk, S.E.11. (19483)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWERS WANTED

"Phoenix" washing machines, makers of? W.W. (19487)

"Invicta" towel rails, makers of? E.B. (19491)

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Electro-Funditor. B688,010. Class 9. Automatic temperature control apparatus for metal heaters used in Linotype, Intertype and Monotype machines. Funditor Ltd., 3 Woodbridge St., London E.C.1.

Emicorder. 694,533. Class 9. Sound recording apparatus, etc. Electric and Musical Industries, Ltd., Blyth Rd., Hayes.

Helicon. 684,226. Class 9. Wireless valves. Helikon, Ltd., 234 Bishopgate, London E.C.2.

Kada. B690,701. Class 9. Magnets and electric relays, all for use with electronic and pipe organs. Alfred E. Davies & Son, Ltd., Organ Works, Campbell Sq., Northampton; and B. Kimber Allen & Co., 2 Myron Place, S.E.13.

Pigebestal. 692,997. Class 9. Asbestos-insulated, aluminium-sheathed cables. **Pigemultiflo.** 692,998. Class 17. Multi-channelled flexible conduits made solely or mainly of plastics. Pirelli-General Cable Works Ltd., 343-345 Euston Rd., N.W.1.

PRICES OF CABLE METALS AND OTHER MATERIALS

(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	202 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	215 10 0	—
Delivered in 4th, 5th and 6th month after order	217 0 0	—
LEAD, good soft pig (foreign)	136 0 0	136 0 0
,, ,, ,, "English" quality	137 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) (Cash)	1455-1465	—
,, (3 months)	1385-1390	—
ALUMINIUM, commercial purity (del.) ...	124 0 0	—
ZINC	151 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	46 10 0	—
Mild Steel Tape (0.04 in.)	26 10 0	—

TRADE NOTES

Transfer.—The sales depts. of the Sloan Electrical Co., Ltd., have been transferred to Slonetric House, Bondway, Vauxhall, S.W.8. A trade counter service is also maintained at 41 Kingsway, W.C.2.

Changes of Address.—Today, March 1, the Central Price Regulation Committee moves to Clive House (7th floor), Petty France, S.W.1. Tel.: Abbey 8010.

Sharp Control Gear, Ltd., have now moved to Lount Works, Ashby-de-la-Zouch, Leicestershire. Tel.: Ashby 422.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Alan Brown (Portsmouth) Ltd. To take over business of an electrical and acoustic engineer carried on at Portsmouth by Leslie A. Brown. Cap.: £3,000. Dirs.: L. A. Brown and J. W. Collinson.

Geraghty Products Ltd., 153 High Rd., Chiswick, W.4. Coil winders, electrical engineers, etc. Cap.: £1,000. Permanent dirs.: J. E. Geraghty and J. Donnellan.

Hughes and Lucas Ltd., 49 Russell St., Kettering, Northants. Electricians, mechanical engineers, etc. Cap.: £2,000. Permanent dirs.: C. A. Hughes and D. Lucas.

N. R. Kirk and Co., Ltd., 2 and 4 Uttoxeter New Rd., Derby. To take over business of electrical engineers and contractors carried on at Derby by C. Stanley Tagg, Ltd., recently contracted to be sold by the said company to Norman R. Kirk. Cap.: £5,000. Permanent dirs.: N. R. Kirk and Mrs. C. Kirk.

Brian Kille Ltd. To take over business of radio and electrical engineers carried on at Minehead, Som., by Walter B., Anthony C., and Olive Kille. Cap.: £2,000. Dirs.: W. B. Kille (permanent managing dir.) and Olive Kille, 19 Selbourne Place, Minehead; and A. C. Kille.

Meadway Electrical Supplies Ltd., 128 Albany St., N.W.1. Cap.: £1,000. Dirs.: Marie R. Key and Edith M. Key.

James Priddy Ltd., 48 Regent St., Weston-super-Mare. To take over business of an electrical contractor, radio and sports dealer, carried on at Weston-super-Mare by James Priddy. Cap.: £3,000. Dir.: J. Priddy.

Power Controls Ltd. Manufacturers of and dealers in precision electro-mechanical products, power control components, etc. Cap.: £25,000. Dirs.: not named. Subs.: P. M. Threlfall, Summerfield House, Linton, Cambs, and J. W. Dalgleish, 211 Milton Rd., Cambridge.

A. E. Ratcliffe Ltd., 93b Walsworth Rd., Hitchin. To take over business of an electrical and wireless engineer carried on at Hitchin by Albert E. Ratcliffe. Cap.: £3,000. Dirs.: A. E. Ratcliffe and Mrs. G. E. Ratcliffe.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Corwen Electric Light Co. Ltd., Corwen, Merioneth, have appointed Charles Lee Morris, Caxton House, Corwen, as liquidator, to whom creditors should send particulars by Mar. 12.

C.V.P. Electrical Ltd. Meeting of creditors at Feakins English Co., 211 Addiscombe Rd., Croydon, on Mar. 19 at 11 a.m., to nominate, if necessary, a liquidator and committee of inspection.

BANKRUPTCY ACTS

Intended Dividends

Blackburn. Herbert H. Baron, electrician trading at 84 Duckworth St., Darwen. Last day for receiving proofs, March 6. Trustee is Fred Carter Ormrod, 20 Byrom St., Manchester 3.

Lincoln and Horncastle. Eric Weatherburn Chapman, electrical engineer, of London House, King St., Market Rasen. Last day for receiving proofs, March 5. Trustee is Ronald Taylor, 150 High St., Scunthorpe, Lincs.

Public Examination

Philip Haley Leach, radio and electrical engineer, trading as "P. H. Leach," at 4 Oxford St., Guiseley, and 6 Town St., Yeadon, Yorks. At public examination held recently it was reported the statement of affairs disclosed a deficiency of £23,733. Business as a radio dealer was started in 1939, and later a similar business at Town St., Yeadon. Between 1947 and 1950 he borrowed money and, still short of working capital, obtained further sums from finance companies. The examination was adjourned.

BUSINESS PROSPECTS

HOME

Barton-on-Humber U.D.C. Further 36 houses to be built on Tofts Rd. estate.

Bexhill T.C. Plans approved for erection of 84 dwellings on Southlands Rd. estate.

Bathavon R.D.C. Erection of 26 houses at Batheaston. County Architect, H. H. Goldsmith, 18 Gay St., Bath.

Belford R.D.C. Council to build 18 houses at Seahouses and 14 at Belford.

Brierley Hill (Staffs) U.D.C. Council to go ahead with scheme for proposed civic centre.

Brighton T.C. Tenders likely to be invited for erection of 62 flats and 4 shops with flats at Bates Nursery, Lewes Rd.

Bullingdon (Oxon) R.D.C. It is proposed to build 26 houses at Culham and 6 at Denton.

Burton-on-Trent T.C. Scheme approved for erection of 20 shops and 10 dwellings on Manners and Waterside estates.

Caithness. C.C. to build 48 houses on a number of sites.

Cambridgeshire. Secondary modern school to be built at Bassingbourn at estimated cost of £86,940.

Castlebar (Mayo) U.D.C. Proposed to build 48 houses in Newport Rd. and a further 28 on the Gallows Hill Rd.

Cheltenham T.C. Erection of 56 dwellings on Hester's Way estate. G. G. Marsland, Borough Engineer, Municipal Offices.

Chichester R.D.C. Council proposes to erect 18 houses at Southbourne, 12 at East Wittering, 10 at Selsey and 70 houses on various other sites.

Corby (Northants) U.D.C. Erection of four two-storey blocks of flats. G. B. Blackall, Clerk of the Council, Council Offices.

Coventry. Council approved establishment of wholesale fruit market. Estimated cost is £306,000.

Dalkeith T.C. Dean of Guild Court has approved erection of 48 houses in the Woodburn area.

Darlington T.C. Couzens and Brown, Queen St., London S.W.1, have been appointed consultants for electrical work at Greenbank Maternity Hospital for Newcastle-on-Tyne Regional Hospital Board.

Dartford (Kent) R.D.C. It is proposed to build 54 houses at Swanley and 8 at Fawkham Green.

Daventry T.C. Tenders to be invited for erection of 30 houses.

Denton U.D.C. Construction of 48 houses on Haughton Hall site. Engineer and Surveyor, Town Hall.

Doncaster. About 8,000 N.C.B. houses are shortly to be fitted with electricity.

Droitwich (Worcs) R.D.C. Fifty-four houses and six bungalows to be built at Wychbold and flats at Fernhill Heath.

Dundee. Scottish Special Housing Association to build 280 houses at Mains of Fintry. Association is at 15 Palmerston Pl., Edinburgh.

Easington (Durham) R.D.C. Council to build 95 houses this year. Surveyor is R. R. Lumsden.

Folkestone T.C. Tenders being invited for erection of 40 houses on Biggins Wood site and 8 on two other sites. Borough Engineer, Municipal Offices, West Terr.

Hastings T.C. Erection of 16 flats in four blocks and 16 houses at Hollington; also of 10 houses at Ore. Borough Engineer, 37 Wellington Sq.

Heanor U.D.C. Erection of 80 houses on Marlpool Farm estate. R. Archer, Engineer and Surveyor, Council Offices, Heanor, Derby.

Ilkeston T.C. Construction of 86 houses on Kirk Hallam estate. A. O. Marshall, Borough Surveyor, Town Hall.

Ipswich T.C. Plans approved for erection of 632 houses, 152 flats and 64 bungalows on Chantry estate.

Kingston-on-Thames. Erection of 80 houses on Chessington Hall estate. A. W. Forsdike, Town Clerk, Guildhall.

Kirkcudbright. Tenders shortly to be invited for domestic appliances for Carlingwork House, Castle-Douglas. Names can be lodged with County Medical Officer, Public Health Dept., Dunmuir Rd., Castle-Douglas.

Litherland (Lancs.) U.D.C. Erection of 15 shops and 30 flats in Kirkstone Rd. North. Quiggin and Gee, Chartered Architects and Surveyors, 11 Old Hall St., Liverpool 3.

Lurgan (Armagh). N. Ireland Housing Trust, 5 Donegall Sq. South, Belfast, proposes to build 162 houses in Warren Park area.

Middlesbrough T.C. Erection of 76 houses at Berwick Hills. Borough Engineer and Surveyor.

Neath T.C. Erection of 50 houses on Cimla site. Borough Engineer's Office, Gwyn Hall, Neath.

Nottingham. Erection of 166 houses at Bestwood. C. A. Pilkington, City Housing Architect, The Guildhall.

Northallerton U.D.C. Construction of 70 houses on Valley Rd. estate. Clerk to the Council, 72 High St. North.

Ormskirk (Lancs) R.D.C. Council to build 40 houses on Scott estate and 24 at Burscough.

Sevenoaks R.D.C. Erection of 36 houses at Childsbridge Lane, Seal.

South Shields. Tenders being obtained for erection of 124 houses at Simonside.

St. Albans (Herts) R.D.C. Council to apply for sanction to borrow £41,700 for erection of 40 flats at London Colney.

St. Pancras. Fifty flats to be built in Regent's Park scheme and about 96 on Lamble St. site.

Stamford (Lincs.) T.C. Council to build further 54 houses on Drift Rd. estate.

Taunton T.C. Construction of 100 houses on Bridgwater Rd. estate. Applications to Borough Housing Architect, 2 Baldwin Road.

Thame (Oxon) U.D.C. Plans approved for erection of 34 houses in Aylesbury Rd. and 4 in Broadwaters Av.

Wandsworth. Scheme approved for development of Chartfield Av. site by erection of 227 flats and 24 maisonettes in 12 blocks. Estimated cost, £499,000. Architects are Lanchester and Lodge.

West Riding. Erection of police premises, comprising 31 houses and 6 offices in various districts. County Architect, "Bishopgarth," Westfield Rd., Wakefield

OVERSEAS

Malaya. H. A. O'Connor and Co., Ltd., 7-12 Laidlaw Bldg., Singapore, wish to obtain agencies from U.K. manufacturers of domestic electrical appliances, electric lamps and valves and household wiring. Firms should contact Mr. H. A. O'Connor who is at 17 Queen's Gate Terrace, S.W.7.

MEETINGS TO NOTE

THURSDAY, MARCH 1

I.E.E. (London).—"London-Birmingham Television Radio-Relay Link." R. J. Clayton, D. C. Espley, G. W. S. Griffiths and J. M. C. Pinkham, 5.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N.W. Section).—"Survey of Television Development and its Problems." H. J. Barton-Chapple. Coll. of Technology, Manchester, 7.15 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Merseyside Section).—"Use of Foster's Theorem in Circuit Design." F. Williams. Elect. Service Centre, Whitechapel, Liverpool, 7 p.m.

I.E.S. (Exeter Group).—"Illumination and Illusion." P. Hartill. Agricultural Hse., Queen St., 7 p.m.

INCORP. PLANT ENGRS. (Peterborough Branch).—"Discharge Lighting," Eastern Gas Bd., 7.30 p.m.

I.E.E. (Bristol Students' Section).—"Introduction to Metal Rectifiers." K. Rout, and "Track Circuits," N. A. Miller. Electricity Showrooms, Bath, 7 p.m.

DOLLAR CONVENTION.—To be held at Eastbourne, opening at Winter Garden at 8.30 p.m. Continues on Friday and Saturday.

FRIDAY, MARCH 2

BIRMINGHAM ELECT. CLUB.—Annual dinner at Grand Hotel, 6.30 p.m.

I.E.E. (N.E. Students' Section).—"The Schlieren System." B. Berger. King's College, Newcastle, 6.30 p.m.

I.E.E. (N. Staffs. Sub-centre).—Annual dinner and visit of President. Crown Hotel, Stone, 7 p.m.

I.E.S. (Bath and Bristol Centre).—"Illumination and Illusion." P. Hartill. S.W. E.B., Bath, 7 p.m.

INSTN. OF WORKS MANAGERS (Notts and Derby Branch).—"Is Management an Art or a Science?" J. Ayres of Brush Elect. Eng. Co. Midland Hotel, Derby, 7.30 p.m.

MONDAY, MARCH 5

I.E.E. (London Discussion Circle).—Discussion on "Best Means of Explaining the Internal Operation of Electronic Valves." Savoy Pl., W.C.2, 6 p.m.

I.E.E. (Ipswich).—"Lightning." R. H. Golde. Gt. White Horse Hotel, 6.30 p.m.

I.E.E. (Maidstone).—"Polyphase Commutator Motors." J. W. Hibbert. New Inn, Sandling Rd., 7.30 p.m.

I.E.E. (Mersey and N. Wales Centre).—"Mechanical Handling." A. Roebuck, H. S. Carnegie and E. G. Taylor. Liverpool Royal Instn., Colquitt St., 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"The Nervous System as a Communication Network." J. A. V. Bates. King's College, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Centre).—Discussion on "Engineering—Financial Problems Arising in the Electricity Supply Industry." James Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

I.E.E. (Leeds Centre).—"Lighting of Departmental Stores." A. W. Jervis. Lighting Service Bureau, Aire St., Leeds, 7 p.m.

I.E.S. (Sheffield Centre).—"Railway Light Signalling System." G. G. F. Halliwell. University, Weston Bank, 6 p.m.

BRADFORD ENGRNG. SOC.—"Manufacture of Super-Tension Cables." F. W. H. Shaw. Tech. College, 7.15 p.m.

A.S.E.E. (N.E. London Branch).—"Electrical Suppression of Interference." G. L. Stephens. Angel Hotel, Ilford, 8 p.m.

A.S.E.E. (Sheffield Branch).—"Electricity in the Brewing Industry." S. Biggin. Royal Victoria Hotel, 7.30 p.m.

TUESDAY, MARCH 6

I.E.E. (E. Midland Centre).—"Notes on Electrical Installations in large Chemical Factories." D. B. Hogg. E. Midland Electricity Board Service Centre, Derby, 6.30 p.m.

I.E.E. (Cambridge Radio Group).—Discussion on "Is There an Optimum Speed for a Gramophone Record?" Cavendish Laboratory, 8.15 p.m.

I.E.E. (N. Midland Centre.)—"Performance of the British Grid System in Thunderstorms." J. S. Forrest. B.E.A., 1 Whitehall Rd., Leeds, 6.30 p.m.

I.E.E. (N.W. Centre).—Annual dinner at Midland Hotel, Manchester, 6.45 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"High Fidelity Sound Reproduction." D. T. N. Williamson. University, Glasgow, 7 p.m.

ELECTRICAL POWER ENGRS. ASSOC.—"History and Development of Paper Cables." J. Temple-Hazell. E.M.E.B. Showrooms, Corporation St., Coventry, 7 p.m.

A.S.E.E. (W. London Branch).—"Power Plant Installations." W. F. Parker. Hammersmith Town Hall, 7.30 p.m.

WEDNESDAY, MARCH 7

I.E.E. (London Radio Section).—"Design Considerations for a Radio-telegraph Receiving System." J. D. Holland. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (N.E. Scotland sub-centre).—"Control of Hydro-Electric Plant." A. C. H. Frost and W. Brittlebank. Caledonian Hotel, Aberdeen, 7.30 p.m.

I.E.E. (Southern Centre).—"An Organisation for Internal Standardisation in a Large Manufacturing Company." P. J. Daglish. B.E.A. House, Portsmouth, 6.30 p.m.

INSTN. OF ENGNRNG. INSPECTION (Birmingham Branch).—"Manufacture of Seamless Steel Tubes." J. Jenkin, of Tube Investments Ltd. Chamber of Commerce, 7.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"High Fidelity Sound Reproduction." D. T. N. Williamson. University, Drummond St., Edinburgh, 7 p.m.

I.E.S. (Newcastle Centre).—"Design of Lighting Fittings." W. R. Stevens. Minor Durrant Hall, Oxford St., 6.15 p.m.

I.E.S. (Huddersfield Group).—"Electric Lighting—A Contractor's Viewpoint." J. Ashmore. Elect. Showrooms, Market St., 7.15 p.m.

I.E.S. (Swansea Group).—"Problems Associated with Underground Lighting in British Coal Mines." D. A. Strachan. 4 Northampton Gardens, 5.45 p.m.

MANCHESTER ASSOC. OF ENGRS. (Students' Section).—"Manufacture of Electric Cables." E. P. G. Thornton. Engineers' Club, Albert Sq., 7 p.m.

ELECT. POWER ENGRS.' ASSOC.—"Electric Kilns." Dr. W. L. German, M.E.B. Back Glebe St., Stoke-on-Trent, 7 p.m.

A.S.E.E. (York Branch).—"Electrical Loading of a Fabrication Shop." J. J. Sheldon. Royal Station Hotel, 8 p.m.

THURSDAY, MARCH 8

ASSOCIATION OF ELECTRICAL HOUSECRAFT ADVISORS.—Annual meeting at 35 Grosvenor Place, S.W.1, 7 p.m.

DUNFERMLINE ELECT. SOC.—"Post Office Automatic Systems." J. T. McLoughlin. Unitas Hall, Queen Anne St., 7 p.m.

I.E.E. (Cambridge Radio Group).—Annual dinner.

I.E.E. (N.E. Scotland sub-centre).—"Control of Hydro-Electric Plant." A. C. H. Frost and W. Brittlebank. Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (Southern Centre).—Annual dinner-dance and visit of President. Polygon Hotel, Southampton, 7.30 p.m.

I.E.E. (Swansea sub-centre).—Informal meeting. Three short papers. Plaza Cinema, 6 p.m.

I.E.S. (Cardiff Centre).—"Problems Associated with Underground Lighting in British Coal Mines." D. A. Strachan. School of Mines, Treforest, 5.45 p.m.

I.E.S. (Leicester Centre).—"Hospital Lighting." M. W. Peirce and D. J. Reed. E. Midlands Elect. Boards, Charles St., Leicester, 6.30 p.m.

I.E.S. (Manchester Centre).—Members evening. Coll. of Technology, Sackville St., 6 p.m.

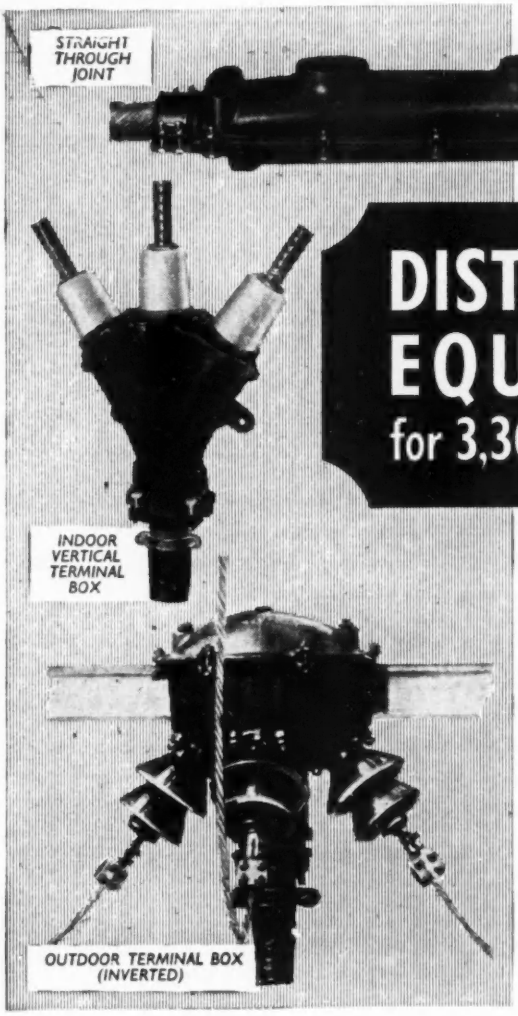
ENGRS. GUILD (Metropolitan Branch).—Discussion on "Engineer and the Public." Introduced by H. Nimmo, chairman, Southern Elect. Board, Caxton Hall, S.W.1, 6 p.m.

FRIDAY, MARCH 9

I.E.E. (E. Midland Centre).—Annual dinner and visit of President. Victoria Station Hotel, Nottingham, 6.45 p.m.

I.E.E. (Mersey and N. Wales Centre).—Dinner-dance at Reece's Restaurant, Parker St., Liverpool, 6.30 p.m.

I.E.E. (N. Ireland Centre).—Annual Conversazione at Grand Central Hotel, Belfast, 8.30 p.m.



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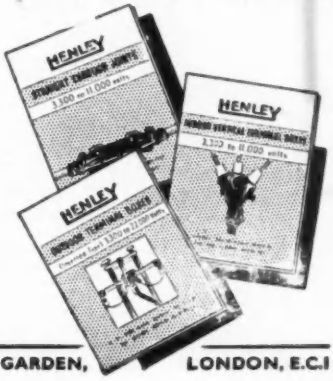

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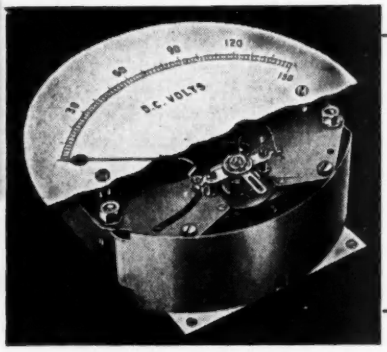
Combining the sensitivity of a laboratory instrument with the robust qualities of a switchboard pattern, this new series of 'Weston' permanent-magnet, moving coil instruments represents a great advance in design and technique. They incorporate thermocouples and rectifiers where necessary. Special features include efficient damping, the new standard 'Weston' patented spring-loaded jewel to protect the pivot, magnetic shielding and a high degree of accuracy. Mounted in attractive bakelite cases, flush fitting or projecting, the 6" easily read scale is printed in black on white enamel. All instruments conform to B.S.I. Spec. No. 89. Special enquiries will receive the personal attention of our Technical experts. The model S57 illustrated is supplied as a D.C. Microammeter, Milliammeter, Millivoltmeter, Ammeter and Voltmeter, all with a variety of ranges.



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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF MANCHESTER

THE LIBRARIES COMMITTEE invite tenders for the ELECTRICAL INSTALLATION, HOLLYHEDGE ROAD BRANCH LIBRARY, WYTHENSHAWE.

Specification and drawings may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s., which sum will be returned upon receipt of bona fide tender. All cheques and postal orders are to be made payable to the order of "The Corporation of Manchester" and crossed.

Sealed tenders, enclosed in the official envelope, to be delivered at the Town Hall, not later than 10 a.m. on Monday, March 12, 1951.

The Corporation do not bind themselves to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
February. (K 3)

CITY AND COUNTY OF THE CITY OF CHESTER

Two Stream Infants School, Blacon

TO ELECTRICAL ENGINEERS AND WIRING CONTRACTORS

THE Corporation invite firms of repute, who are experienced in Electrical Contracts of a considerable size, and who wish to tender for the Electrical Installation and Wiring of this School, to send in their names and addresses to the City Engineer and Surveyor, Municipal Offices, 43 Northgate Street, Chester, before March 9, 1951.

Specifications, plans and form of tender will be forwarded after that date.

Each application must be accompanied by a fee of two guineas, which will be returned after the receipt of a bona fide tender. (K 4)

BOROUGH OF NEWCASTLE UNDER LYME

TENDERS are invited for the supply and installation of lanterns, lamps, control gear and concrete standards for approximately ¼ mile of Group "A" Lighting on Bradwell Lane. 140 watt, horizontal burning, sodium vapour discharge lamps are specified at a mounting height of 25 ft.

Drawings and contract documents may be obtained from the office of the Borough Engineer and Surveyor, Lancaster Building, Newcastle, Staffs., on payment of a deposit of £2. This sum will be returned on receipt of a bona fide tender and return of all contract documents. The successful contractor will be required to comply with Standing Orders of the Council relating to contracts.

Tenders are to be delivered to me not later than 10 a.m. on Tuesday, March 13, 1951. No tender will be received except in a plain sealed envelope, which shall bear the words "Tender for Supply and Erection of Street Lighting Installation for Bradwell Lane," but shall not bear any mark or name indicating the sender.

The lowest or any tender will not necessarily be accepted.

C. J. MORTON,
Town Clerk.

District Bank House,
Penkhull Street,
Newcastle, Staffs. (K 35)

APPOINTMENTS VACANT

ASSISTANTS required for Test Bed of Electrical Engineering firm in North West Kent. Applicants should have knowledge of a.c./d.c. motors and allied apparatus. State age, experience, and wage required.—Box No. 3089, Electrical Times. (H 668)

BRITISH ELECTRICITY AUTHORITY

Headquarters, London

OVERSEAS LIAISON ENGINEER

APPLICATIONS are invited for the post of Overseas Liaison Engineer in the office of the Deputy Chairman (Operation) at headquarters in London.

The duties of the post include keeping in touch with all aspects of the electricity supply industry in overseas countries and preparing general reports thereon, receiving overseas visitors, and assisting specialist members of the staff to maintain contact with overseas practice.

The salary for the appointment, which is superannuable, will be within the provisional range £1,200 to £1,750 per annum. Applicants should have a good knowledge of French and German, with educational and engineering qualifications at least up to the standard required for associate membership of the I.E.E.

Preference will be given to candidates with a university degree in electrical engineering and who have had considerable experience in the electricity supply industry. Some experience in an electrical plant manufacturer's works is also desirable.

Applications, stating age, present salary, and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, not later than March 16, 1951.

Please quote reference AE/139. (K 22)

BRITISH ELECTRICITY AUTHORITY

South Western Division

STATION SHIFT CONTROL ENGINEER, PORTISHEAD POWER STATION

APPLICATIONS are invited for the position of Station Shift Control Engineer at Portishead Power Station.

Applicants should possess good technical qualifications, and have had sound technical training and practical experience in the control and operation of steam generating plant and main switchgear.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "J," Grade 10, £609 to £633 per annum.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than March 8, 1951.

R. C. BARRETT,
Divisional Secretary.

February 19, 1951. (K 14

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER at East Power Station, Newport, at a salary in accordance with the Revised National Joint Board Agreement, Class "F," Grade 7 (£625-£643 per annum). Applicants should preferably have served a regular apprenticeship, obtained the Higher National Certificate and had previous operational experience in a modern generating station.

The appointment is superannuable in accordance with the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary's Office at the address below, to whom completed forms should be returned not later than March 15, 1951.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
February 22, 1951. (K 48)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the following positions as Draughtsmen in the Generation (Construction) Department at Divisional Headquarters, Birmingham.

(a) SENIOR CIVIL ENGINFERING DRAUGHTSMEN

Candidates should hold Higher National Certificate in Civil engineering or an equivalent qualification, and should have had experience in (i) the design and layout of power stations or large engineering works and (ii) the design and detail of ferro-concrete structures.

Salary will be within the provisional range of £500/£600 per annum.

(b) SENIOR MECHANICAL DRAUGHTSMAN

Applicants should be associate members of the Institution of Mechanical Engineers, or hold an equivalent qualification, and should have had experience in either the design and layout of all types of mechanical equipment for power stations or large industrial works, or a sound workshop training and a knowledge of the design of boilers, turbines, condensing plant and ancillary equipment.

Salary will be within the provisional range of £600/£700 per annum.

The salary ranges quoted are provisional and subject to negotiation with the appropriate organisation. Conditions of service and superannuation will be under terms approved by the British Electricity Authority.

Applications should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 17, 1951.

F. W. LAWTON,
Divisional Controller.
(K 43)

AIR MINISTRY

STATION ENGINEERS

THERE are vacancies for Station Engineers in the Directorate General of Works at R.A.F. Stations in the provinces.

The salary rises to a maximum of £525 a year and starting pay depends upon age, experience and qualifications. Annual increases will be granted for satisfactory service where salary is below the maximum.

Appointments are non-pensionable but a scheme is in preparation to fill permanent pensionable appointments.

There is no upper age limit but preference will be given to candidates who are young enough to undertake a tour of duty abroad.

Applicants must (a) hold an Ordinary National Certificate in Electrical or Mechanical Engineering or show that they have reached an equivalent standard of technical education; (b) have served a recognised apprenticeship in electrical or mechanical engineering with a firm or establishment of good repute; (c) have had three years' employment in electrical or mechanical engineering, preferably on the operation and maintenance of mine, factory or workshop plant and services.

Preference will be given to applicants who subsequent to (b) and (c) have had experience of supervising staff.

The work consists of the installation, operation and maintenance of high and medium voltage electrical distribution systems, electrical installations, generating plant, steam and hot water heating systems and miscellaneous works, plant, tools and equipment.

Appointments to locations at or nearest to those specified in applications will be arranged as far as possible.

Applications, stating age, qualifications and all previous appointments, with dates, to be addressed to the Under-Secretary of State, Air Ministry, S.2(h), Cornwall House, Stamford Street, London S.E.1. (K 19)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

ASSISTANT SHIFT CHARGE ENGINEER—LITTLE BARFORD GENERATING STATION

Salary in accordance with the revised N.J.B. Schedule, Grade 9, Class "G" (£571 to £597 per annum).

Applicants should have served an apprenticeship and obtained an ordinary National Certificate in Electrical and/or Mechanical Engineering or equivalent, and possess experience in the operation of generating stations.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards superannuation scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than March 10, 1951. Envelopes should be endorsed "Assistant Shift Charge Engineer—Little Barford."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 734)

NOTTINGHAMSHIRE COUNTY COUNCIL

County Architect's Department

APPLICATIONS are invited for the following appointments at salaries in accordance with the scales of the National Joint Council:—

(a) TWO ELECTRICAL ENGINEERING ASSISTANTS. Salary £520 x £15 p.a. to £570 (APT. Grade V).

(b) ONE ELECTRICAL ENGINEERING ASSISTANT. Salary £390 x £15 p.a. to £435 (APT. Grade I).

Candidates for (a) must be capable draughtsmen with experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. They must also be graduated members of the Institution of Electrical Engineers. Duties will include the preparation of drawings and specifications, inspection of existing installations and supervision of new installations.

Candidates for (b) should have served an apprenticeship in electrical installation work and have had experience in the preparation of installation drawings. They should also have passed the Ordinary National Certificate Examination in electrical engineering.

The appointments will be superannuable and the successful candidate will be required to pass a medical examination.

Application forms and further particulars are obtainable from the County Architect, County Hall, Trent Bridge, Nottingham, and must be completed and returned to him by March 17, 1951. Canvassing will disqualify.

K. TWEEDALE MEABY,
Clerk of the County Council.
(K 51)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for posts as JUNIOR ENGINEERS (Shift Duties) at the following Generating Stations.

No. 378. Agecroft L.P. Salary range £375/£406 per annum, in accordance with Grades 15/14, Class "F."

No. 379. Agecroft H.P. Salary range £375/£428 per annum, in accordance with Grades 16/14, Class "G."

No. 380. Westwood, Wigan. Salary range £375/£428 per annum, in accordance with Grades 16/14, Class "G."

Candidates should preferably possess technical qualifications, and previous experience in a Generating Station will be an advantage.

Applications are also invited for the following positions in the Generation (Construction) Department, which at present is situated at Agecroft Generating Station, Pendlebury, near Manchester.

No. 383. SENIOR ASSISTANT ENGINEER (Mechanical). Grade 1, Schedule C, Class "AX/DX," £884/£1,108 per annum.

No. 384. 2—SECOND ASSISTANT ENGINEERS (Mechanical). Grade 2, Schedule C, Class "AX/DX," £752/£966 per annum.

Candidates should have experience in the design, layout and installation of turbine and boiler plant associated with modern Generating Stations. Experience in a large manufacturer's works would be an advantage.

No. 385. 2—THIRD ASSISTANT ENGINEERS (Electrical). Grade 5, Schedule C, Class "AX/DX," £579/£776 per annum.

Candidates should have experience in the design, layout and installation of the electrical plant associated with modern Generating Stations. Experience in a large manufacturer's works would be an advantage.

All the posts are superannuable, and the salaries are in accordance with the Revised National Joint Board Agreement.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be received by The Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than March 10, 1951. (K 30)

BRITISH BROADCASTING CORPORATION

BBC INVITES applications for a post of ENGINEER in the Power Section of Planning and Installation Department, London. The post is permanent, and offers wide and interesting experience. Applicants should possess a degree in Electrical Engineering (or equivalent) and should preferably have served an apprenticeship with a manufacturing concern. A good knowledge of H.V. and M.V. switchgear, transformers, diesel alternators, motor-generators, rectifiers and batteries is essential, and preference will be given to candidates having experience of works tests and of the erection and commissioning of such equipment on site. Starting salary £575 p.a. (may be higher if qualifications and experience are exceptional), rising by annual increments on a five-year progression to £725 p.a. Successful applicant will be considered for admission to the established staff (contributory pension scheme) after two years' qualifying period. Applications, stating age, qualifications and experience, to reach Engineering Establishment Officer, Broadcasting House, London W.1, within 7 days. (K 40)

CITY OF BULAWAYO, SOUTHERN RHODESIA

VACANCY: GENERATION ENGINEER

GROSS EMOLUMENT: £1,225 RISING TO £1,395, PLUS CHILDREN'S ALLOWANCES

APPLICATIONS are invited from Chartered Engineers, preferably Corporate Members of the Institution of Mechanical Engineers, for the above vacancy, which involves responsibility to the City Electrical Engineer for the efficient maintenance and operation of the Council's two Power Stations with plant of 88.5 MW combined capacity including installations on order and under erection, the major portion of which operates at 635 p.s.i. and 850 deg. total temperature.

Applicants should, apart from possessing the above minimum qualifications, have had satisfactory training and experience in modern power station practice.

The commencing gross emolument will be £1,225 5s. rising by four annual increments to £1,394 13s. plus children's allowances. This is based on a salary scale of £1,106 16s. by £43 4s. to £1,281 12s. plus a variable cost of living allowance at present fixed at a rate of £92 9s. at the commencement of the grade and £89 1s. at the top of the grade, plus a stand-by allowance of £2 a month. Children's allowances of £30 per annum for the first child and £24 per annum for each of the next two children will also be payable.

In Southern Rhodesia the income tax payable by the successful applicant, if married and with two children, is at present approximately £10 per annum on a total initial emolument of £1,279 per annum.

A house will be available on the power station site at a rental of £8 a month, but the successful applicant may make private arrangements for accommodation should he so desire. The successful applicant, after a satisfactory probationary period of twelve months, will, if under the age of 45 years, be required to join the pension fund, on obtaining a satisfactory certificate from the Council's medical officer of health.

Applications, giving full personal and professional details, and accompanied by one unmounted photograph, should be sent by airmail so as to reach the undersigned by not later than noon on Friday March 16, 1951.

H. J. COOK,
Town Clerk.
(H 708)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT ENGINEER—
Sittingbourne Sheerness Faversham District

SALARY of £732 p.a., rising to £760 p.a., under the N.J.B. Schedule, Class "D," Grade 3. Superannuation will be arranged. Applicants must have had considerable experience in all branches of distribution work, including the operation and maintenance of high and low voltage cables, switchgear, transformers, overhead lines, substations, protective gear, etc. Appropriate technical qualifications an advantage.

Applications, giving two referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, South Eastern Electricity Board, 178/184 High Street, Rochester, Kent, by March 12, 1951.

A. L. BURNELL,
Secretary.
February, 1951. (K 39)

MIDLANDS ELECTRICITY BOARD

Birmingham Sub-Area

APPOINTMENT OF ASSISTANT CONSTRUCTIONAL ENGINEER

APPLICATIONS are invited for the position of Assistant Constructional Engineer in the Engineer's Dept. of the Birmingham and District Sub-Area. Conditions of employment will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry. The salary, subject to negotiation, will be Class "M," Grade 7 (£900 to £930 p.a.)

Applicants should have received a recognised training and be in possession of appropriate professional qualifications, and should have had considerable experience in the preparation of estimates, preliminary plans and working drawings for large building projects, and also be experienced in the administration of contracts and the conduct of negotiations with contractors.

The successful applicant will be required, with the assistance of a suitable staff, to undertake the design, specification and supervision of erection of new buildings and alteration to existing buildings, to provide further centres, depots, substations and reinforced concrete foundations for heavy plant. He will also be required to advise on questions of maintenance, and exercise some supervision over the direct labour staff engaged on maintenance and construction.

Applications, stating age, qualifications, and full particulars of training and experience, should reach the undersigned within seven days of the appearance of this advertisement, in envelopes endorsed "Asst. Constructional Engineer," Emil Braathen, Manager, Birmingham and District Sub-Area, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
February 24, 1951. (K 44)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Northmet Sub-Area

DISTRICT COMMERCIAL ASSISTANT—Hertford
(Ref. No. 274)

Applicants must be of good address and have an all-round knowledge of installation work and domestic appliances, together with an aptitude for sales work. It would be an advantage if the applicant possesses the E.D.A. Salesmanship Diploma and the ability to plan and prepare quotations for installations, including water-heating installations.

The salary for the appointment will be in accordance with Grade 2 of the N.J.C. Agreement (£390 to £450 per annum), at a point dependent upon the applicant's ability and experience.

Application forms may be obtained from the District Manager, Eastern Electricity Board, Northmet Sub-Area, Bridgefoot Ware, Herts, to whom completed forms should be returned within fourteen days of the appearance of this advertisement.

Norfolk Sub-Area

ELECTRICITY SERVICE MANAGER
King's Lynn and Western District—Hunstanton Branch

Candidates should have had sound training in the Electricity Supply Industry. Commercial practices and wide experience in the preparation of specifications and estimates for all forms of installation work. Experience in rural development would be an added qualification.

The annual provisional salary for this appointment will be £630.

Applications, stating age, experience, education, qualifications and details of present appointment, should be addressed to The Manager, King's Lynn and Western District, Eastern Electricity Board, Gaywood Bridge, King's Lynn, Norfolk, so as to arrive within fourteen days of the appearance of this advertisement.

Both future salaries and conditions of service for these appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination. (K 52)

BRITISH ELECTRICITY AUTHORITY

POWER STATION SUPERINTENDENT, KINGSTON

THIS position covers Kingston "A" and "B" power stations comprising 128·75 MW. Salary Class "G", Grade I of the National Joint Board Agreement, which is £1,119 per annum inclusive of London weighting.

The division's policy is for its power stations superintendents to be managers. Applicants should therefore have the following qualifications:—

Proved (*a*) Leadership and administration;
(*b*) Organising ability;
(*c*) Technical education preferably up to B.Sc. standard;
(*d*) Experience in high-pressure, high-temperature plant.

Every encouragement will be given to thought, initiative, and enthusiasm. No form of application will be issued.

Applications, with names of three referees and copy of birth certificate, addressed to the Divisional Secretary, British Electricity House, Lower Ham Road, Kingston-upon-Thames, to be received by March 23, 1951. (K 64)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

THIRD ASSISTANT ENGINEER—GENERATION OPERATION DEPARTMENT

APPLICATIONS are invited for the position of Third Assistant Engineer in the Generation (Operation) Department, Headquarters, Nottingham.

Salary and conditions of service will be in accordance with Class "AX/DX," Grade 5 of Schedule C of the National Joint Board Agreement (£579 to £776 per annum).

The post will be superannuable within the provisions of the British Electricity Authority and Area Boards' superannuation scheme.

Applicants should have received a thorough technical and practical training in generating station operation, and should have had some administrative experience.

Candidates should have educational and technical qualifications up to the standard required for associated membership of the Institute of Electrical Engineers.

Applications should be submitted on the official form, which can be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than Monday, March 12, 1951.

W. S. BURGE,
Divisional Controller.
(H 723)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER (Construction) in the Generation Construction Department.

The successful applicant will be required to act as Assistant to the Site Engineer at the Northampton Power Station.

Applicants must hold the Higher National Certificate in Electrical Engineering, or be Graduate Members of the I.E.E., and should preferably have had workshop training.

Salary and conditions of service will be in accordance with the National Joint Board Schedule, Class "AX" (8) commencing at £437 per annum.

The post is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, should be returned not later than Monday, March 12, 1951.

W. S. BURGE,
Divisional Controller.

February 16, 1951. (H 721)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER (Civil) in the Generation Construction Department. The post will be located at the Northampton Power Station.

Applicants must be chartered Civil Engineers or hold other equivalent qualifications, and should be experienced in the design and supervision of Civil Engineering works.

Salary and conditions of service will be in accordance with Class "AX/DX," Grade 5 of Schedule "C" of the National Joint Board Agreement (£579 to £776 per annum).

The post is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Forms of application, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, should be returned not later than Monday, March 12, 1951.

W. S. BURGE,
Divisional Controller.

February 16, 1951. (H 722)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER—NORTH WILFORD

APPLICATIONS are invited for the position of Shift Charge Engineer at North Wilford Generating Station, Nottingham. Applicants should have a sound technical training and practical experience in the operation and control of modern steam generating plant and switchgear. Preference will be given to candidates having pulverised fuel experience and who have the Higher National Certificate or equivalent qualifications.

The salary for this position will be in accordance with Class "K," Grade 7, of the National Joint Board Agreement. The post will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and returned not later than March 14, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (K 29)

COUNTY BOROUGH OF NEWPORT, MON.

APPLICATIONS are invited for the permanent appointment of ELECTRICAL ENGINEER in the Borough Architect's Department, at a salary in accordance with Grade VI (£595 to £660) of the National Charter.

Candidates, who should be Graduate Members of the Institution of Electrical Engineers, must be capable draughtsmen, with at least five years' experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties include the preparation of all drawings, specifications and supervision of installations, and the inspection of premises, including places of entertainment.

A candidate who is related to a member or senior officer of the Council must disclose the fact in the application. Canvassing, directly or indirectly, will disqualify.

Applications should reach me not later than Monday, March 19, 1951, giving full details of education and qualifications, and the names of two referees.

JOHNSON BLACKETT, F.R.I.B.A.,
Borough Architect.

Civic Centre,
Newport, Mon. (K 45)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of SECOND ASSISTANT ENGINEER (Substations) in the Engineering Department of the Western Sub-Area of the Board, based on Tenby.

Applicants should have had experience in the layout, construction and maintenance of all classes of substations for voltages up to 33 kV. Some experience in the commissioning and maintenance of protective equipment is also desirable.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering, or its equivalent.

The salary will be in accordance with Class "G," Grade 7 (£651/£665/£679) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Nr. Cardiff, so as to reach him not later than March 10, 1951.

D. G. DODDS,
Secretary.
(K 46)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for five vacancies as JUNIOR ENGINEERS at Ocker Hill Generating Station. The salaries for these positions will be in accordance with the N.J.B. Agreement in the range of Class "F," Grades 15 and 14, £375 to £406 per annum.

Applicants should preferably have had experience in a large generating station, and duties will consist mainly of switchboard operation. The possession of Ordinary National Certificate or an equivalent qualification will be considered an advantage. Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Application should be made on forms which may be obtained from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than March 17, 1951.

F. W. LAWTON,
Divisional Controller.
(K 42)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER (Planning and Development) in the Engineering Department of the Western Sub-Area of the Board, based on Tenby.

Applicants should have had experience of system planning work in a predominantly rural area and preference will be given to those who possess the Higher National Certificate in Electrical Engineering or its equivalent.

The salary for the position will be in accordance with Class "G," Grade 10 (£539/£550/£561) of the National Joint Board Agreement for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Nr. Cardiff, so as to reach him not later than March 10, 1951.

D. G. DODDS,
Secretary.
(K 47)

BRITISH ELECTRICITY AUTHORITY

POWER STATION SUPERINTENDENT, LITTLEBROOK

THIS position covers the Littlebrook "A" and "B" power stations, 240 MW, followed by Littlebrook "C", making final megawatt capacity of 480 MW. Present salary Class "J", Grade I of the National Joint Board Agreement £1,274 per annum, inclusive of London weighting, rising to £1,600 after completion of Littlebrook "C".

The division's policy is for its power stations superintendents to be managers. Applicants should therefore have the following qualifications:—

Proved (*a*) Leadership and administration;
(*b*) Organising ability;
(*c*) Technical education preferably up to B.Sc. standard;
(*d*) Experience in high-pressure, high-temperature plant.

Every encouragement will be given to thought, initiative, and enthusiasm. No form of application will be issued.

Applications, with names of three referees and copy of birth certificate, addressed to the Divisional Secretary, British Electricity House, Lower Ham Road, Kingston-upon-Thames, to be received by March 23, 1951. (K 63)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

ASSISTANT ENGINEER (Planning and Development) No. 2 (Newbury) Sub-Area Office. Salary, N.J.B. Class "K," Grade 10, Column 1 (£646 per annum). N.J.B. Conditions of Service.

Duties will include assisting the Planning and Development Engineer in the preparation of schemes and specifications for reinforcing and extending the distribution system, involving substation plant and equipment and mains, operating at voltages up to 33 kV.

Applicants must have sound technical ability and be Corporate Members of the I.E.E., or possess equivalent qualifications. Experience of similar work is necessary, including a knowledge of control and supervisory circuits.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury, and returned to him not later than fourteen days after the appearance of this notice.

DISTRICT CONSTRUCTION ENGINEER

Heston District of No. 1 (Southall) Sub-Area. Salary, N.J.B., Class "E," Grade 7 (£579 to £309 per annum plus London weighting). N.J.B. Conditions of Service.

Duties will include taking charge, under the District Engineer, of the installation and erection of plant, equipment, laying of mains, indoor and outdoor substations, and other constructional work, by direct labour and/or by contract, on an urban distribution system up to and including 11 kV.

Applicants should be at least Graduate Members of the I.E.E., or possess equivalent qualifications, with several years' experience in construction work as defined abve.

Applications on forms obtainable from the Sub-Area Secretary, 2/6 Windmill Lane, Southall, Middlesex, and returned to him not later than fourteen days after the appearance of this notice.

AGRICULTURAL REPRESENTATIVE

Melksham District of No. 2 (Newbury) Sub-Area. Salary, J.N.C., Grade 3 (£450 to £510 per annum). N.J.C. Conditions of Service.

Applicants must possess sound knowledge of the application of electricity in agriculture and horticulture, and be capable of conducting negotiations. Ability to give talks to agricultural organisations will be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury, and returned to him not later than fourteen days after the appearance of this notice.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.
(K 50)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR. Applicants must have had a good general education, and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be an advantage. Candidates must be able to conduct lecture demonstrations both in the service centres and on consumers' premises, and to advise consumers on the selection and use of electrical apparatus. Salary and conditions of service will be in accordance with the National Joint Council Grade I, within the range £310 to £350 per annum, with further progress to £390, dependent upon a certificate of capability. The successful applicant will be required to contribute to the Board's superannuation scheme, if eligible. Applications in writing, stating age, education, qualifications, details of training and experience, should be sent to: Sub-Area Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent. (K 36)

YORKSHIRE ELECTRICITY BOARD

No. 7 (Grimsby) Sub-Area

SECOND ASSISTANT ENGINEER (Distribution Design)
(Vacancy No. 25/51)

APPLICANTS must have had a sound practical training and considerable experience in the planning, construction, operation and maintenance of high and low voltage underground and overhead networks, substation plant, and ancillary apparatus. Preference will be given to candidates who are corporate members of the Institution of Electrical Engineers, or who hold an engineering degree, or equivalent qualification. Salary, N.J.B. Schedule, Class "G," Grade 7, £651/£679 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within fourteen days of the appearance of this advertisement. (K 41)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Area Board Headquarters

Chief Engineer's Department

SECOND ASSISTANT ENGINEER
Distribution Design (Substations)
(Vacancy No. 19/51)

Duties will include the design of substations operating at voltages of 33 kV and above; preparation of schedules and specifications, and ordering of substation plant and equipment, including negotiations with manufacturers and inspection of equipment in course of manufacture; design of protective gear installations for the primary high voltage systems.

Applicants should have had considerable experience of the above duties preferably in a large supply undertaking. Specialist knowledge of h.v. switchgear, large h.v. transformers or protective gear will be an advantage.

Applicants should possess a degree in electrical engineering and be Corporate Members of the Institution of Electrical Engineers.

Salary, N.J.B. Schedule "C", AX-DX. Commencing salary £752 to £884, rising to £966 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Secretary, Yorkshire Electricity Board, Wetherby Road, Scarcroft, Leeds, within 14 days of the appearance of this advertisement.

No. 6 (Hull) Sub-Area

DISTRICT COMMERCIAL ENGINEER (Bridlington)
(Vacancy No. 18/51)

Applicants should have a wide practical experience of commercial, domestic and agricultural installations, and their electrical requirements, including negotiations with consumers, preparation of estimates, planning of installation work and maintenance, and consumer service.

Salary, N.J.B. Schedule Class "D," Grade 4, £667 to £703 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within 14 days of the appearance of this advertisement.

No. 7 (Grimsby) Sub-Area

DISTRICT COMMERCIAL ENGINEER (Scunthorpe)
(Vacancy No. 24/51)

Candidates must be capable of conducting the development of a district, supervising a district commercial organisation having sound experience covering:—

Consumer service;
Industrial and commercial development of electricity supply;
Control of service centre sales and staff;
Control of electrical contracting and maintenance department and staff;
Administration and operation of hire and hire purchase schemes.

Candidates should possess the Higher National Certificate, membership of the Institution of Electrical Engineers, or possession of a technical degree would be an advantage.

Salary, N.J.B. Schedule Class "E," Grade 4, £722 to £752 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER (Grimsby)
(Vacancy No. 23/51)

Salary, N.J.B. Schedule Class "E," Grade 11, £459 to £475 per annum.

SECOND ASSISTANT DISTRICT ENGINEER
(Scunthorpe)
(Vacancy No. 23/51)

Salary, N.J.B. Schedule Class "E," Grade 7, £579 to £609 per annum.

FIRST ASSISTANT DISTRICT ENGINEER
(Gainsborough)
(Vacancy No. 23/51)

Salary, N.J.B. Schedule Class "C," Grade 5, £604 to £628 per annum.

SECOND ASSISTANT DISTRICT ENGINEER
(Gainsborough)
(Vacancy No. 23/51)

Salary, N.J.B. Schedule Class "C," Grade 7, £531 to £553 per annum.

Applicants must have had a good general and technical education and preference will be given to those possessing a recognised degree or certificate in electrical engineering. Applicants must also have had experience in the construction, operation, and calculation of h.t. and l.t. underground and overhead mains systems, and substations associated with urban and rural areas.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 7 (Grimsby) Sub-Area, Yorkshire Electricity Board, Moss Road, Grimsby, within 14 days of the appearance of this advertisement. (K 15)

NORTH WESTERN ELECTRICITY BOARD

SENIOR ASSISTANT (Statistical). Purchasing Section, Chief Engineer's Department, Area Board Headquarters.

APPLICATIONS are invited for the appointment of Senior Assistant (Statistical) in the Purchasing Section, Chief Engineer's Department, Area Board Headquarters, Cheetwood Road, Manchester 8.

Applicants should have wide experience in the electricity supply industry, should be conversant with modern storekeeping methods and systems, and should have experience in the use of office machinery, and of punched card methods. The possession of a recognised accountancy or secretarial qualification will be an advantage.

The salary for the post will be in accordance with Grade 4 of the National Joint Council (Administrative and Clerical Grades) Salary Agreement for the Electricity Supply Industry, i.e. £510 per annum, rising by annual increments of £20 to maximum of £570 per annum.

Applications, stating age, experience and qualifications, present post and salary, should be received by The Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, not later than Saturday, March 10, 1951.

No. 1 Sub-Area

APPOINTMENT OF THIRD ASSISTANT ENGINEER Mains Department, Construction Section.

Applications are invited for the appointment of Third Assistant Engineer in the Construction Section of the Sub-Area Mains Engineer's Department, No. 1 Sub-Area Headquarters, Town Hall, Manchester.

Candidates must have had extensive experience in the installation and maintenance of cable systems of all types and voltages in congested and industrial areas, and in major power stations and substations. Candidates should also be fully conversant with the latest cable and jointing technique up to 33kV, and should have been responsible for the supervision of major works by both direct labour and contract. Associate membership of the Institution of Electrical Engineers will be considered an advantage.

The salary will be in accordance with the National Joint Board Revised Agreement, Class "M," Grade 10, i.e. £727/£739/£751 per annum. The post is superannuable.

Applications, stating age, qualifications, experience, present post and salary, should be received by the Sub-Area Secretary, The North Western Electricity Board, No. 1 Sub-Area, Town Hall, Manchester, P.O. Box 493, not later than Saturday, March 10, 1951.

No. 2 Sub-Area

APPOINTMENT OF GENERAL ASSISTANT ENGINEER (Technical Assistant) for System Planning and Development.

Applications are invited for the appointment of General Assistant Engineer (Technical Assistant) in the System Planning and Development Section of the Sub-Area Technical Engineer's Department.

Candidates should have had a sound training in Electrical Engineering and be competent to assist in the preparation of schemes and estimates for extensions to the high and low voltage systems up to and including 33kV, and in the design and layout of substations. Preference will be given to candidates with experience of protective gear systems and an aptitude for system calculations.

The salary will be in accordance with the National Joint Board Revised Schedule, Class "L," Grade 13, i.e. £547/£561/£575 per annum.

Applications, stating age, general education, qualifications and experience, present post and salary, should be received by E. G. Wardle, Esq., A.M.I.E.E., Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, not later than Saturday, March 10, 1951.

No. 2 Sub-Area

APPOINTMENT OF DISTRICT ENGINEERS—Kearsley and Bolton Districts.

Applications are invited for the appointment of District Engineer in the following districts of the No. 2 Sub-Area.
(a) 2F (Kearsley) District.
(b) 2B (Bolton) District.

Candidates should have had a sound training in Electrical Engineering and considerable experience in the operation and maintenance of high and low voltage networks (overhead and underground) and substations, the supervision of constructional work, and the keeping of essential records of mains and substation equipment and layouts. The successful applicant will be responsible for the general maintenance of supply in the District.

The salary will be in accordance with the revised schedule of the National Joint Board, Class "F," Grade 2, i.e. £916/£937/£958 per annum. The post is superannuable.

Corporate membership of the Institution of Electrical Engineers will be an advantage.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by E. G. Wardle, Esq., A.M.I.E.E., Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, not later than Saturday, March 10, 1951.

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No. 4 Sub-Area

APPOINTMENT OF GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER—South West Fylde District.

Applications are invited for the appointment of General Assistant District Commercial Engineer (Assistant Service Engineer) in the 4D (South West Fylde) District, covering Blackpool and St. Annes-on-Sea.

The person appointed will be required to undertake the direct supervision of appliance reconditioning and repairs in the workshops and on consumers' premises and of the installation of appliances sold or hired to consumers.

The salary for the post will be in accordance with the Revised National Joint Board Schedule, Class "F," Grade 12, i.e. £443/£451/£459 per annum.

Applications, stating age, experience and qualifications, present post and salary, should be received by the Sub-Area Manager, No. 4 Sub-Area, The North Western Electricity Board, 40/41 Lune Street, Preston, not later than Saturday, March 10, 1951.

No. 5 Sub-Area

APPOINTMENT OF GENERAL ASSISTANT DISTRICT COMMERCIAL ENGINEER—Burnley District.

Applications are invited for the appointment of General Assistant District Commerical Engineer in the Burnley District of the No. 5 Sub-Area.

The duties will be to assist generally in all activities connected with the utilisation of electricity for domestic, commercial, agricultural and industrial purposes.

The salary will be in accordance with the National Joint Board Revised Schedule, Class "F," Grade 13, i.e. £405/£414/£423 per annum.

Applications, stating age, qualifications, experience, present post and salary, should be received by R. H. Harral, M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, March 10, 1951. (K 31)

BRITISH ELECTRICITY AUTHORITY

London Division

MAINTENANCE ENGINEER (ELECTRICAL)—WEST HAM GENERATING STATION

APPLICATIONS are invited for this position from candidates who are qualified engineers and have had workshop training with wide general experience of power-station electrical equipment and practical experience of e.h.t. switchgear and protective gear.

Salary in accordance with revised N.J.B. Schedule, Class "G," Grade 7, plus London Allowance, £683 11s. per annum.

ASSISTANT SHIFT CHARGE ENGINEER—STEPNEY GENERATING STATION

Applications are invited for this position from candidates who have had a sound engineering training and possess technical qualifications to Higher National Certificate Standard, followed by power-station or marine experience. Knowledge of pulverised fuel firing an advantage.

Salary in accordance with revised N.J.B. Schedule, Class "F," Grade 9, plus London Allowance, £564 18s. per annum.

JUNIOR ENGINEERS—BARKING GENERATING STATION

Applications are invited for Junior Engineers to assist where required in the technical control of power-station work. Periods of shift duty will probably be required.

Applicants must have sound technical training to approximately High National Certificate standard, and should also possess practical experience of power-station plant.

Commencing salary in accordance with revised N.J.B. Schedule, Class "M," Grade 18, plus London Allowance, £465 per annum.

All the foregoing appointments are subject to superannuation under the terms of the B.E.A. and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(K 38)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

JOINTERS: The above Electricity Board have vacancies in Berwick-on-Tweed, Hawick, and Galashiels for several jointers, Class I.

Conditions and rate of pay, at present 36.5 pence per hour, in accordance with the current N.J.I.C. Agreement.

Applications, stating age, whether married or single, and giving details of training, experience and present occupation, should reach the undersigned not later than fourteen days from the appearance of this advertisement.

G. H. SANKEY,
Sub-Area Manager.
(H 49)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR in the Stroud District. Applicants must have had a good general education, and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be an advantage. Candidates must be able to conduct lecture demonstrations both in the service centres and on consumers' premises, and to advise consumers on the selection and use of electrical apparatus. Salary and conditions of service will be in accordance with the National Joint Council Grade I, within the range £310 to £350 per annum, with further progress to £390, dependent upon a certificate of capability. The successful applicant will be required to contribute to the Board's superannuation scheme, if eligible. Applications in writing, stating age, education, qualifications, details of training and subsequent experience, should be sent to: Sub-Area Manager, Midlands Electricity Board, 126 London Road, Gloucester, within fourteen days. (K 37)

ELECTRICAL POWER ENGINEERS' ASSOCIATION

APPOINTMENT OF ASSISTANT SECRETARY

THE NATIONAL EXECUTIVE COUNCIL of the Electrical Power Engineers' Association invites applications for the appointment of an Assistant Secretary.

Applicants should be under 45 years of age and it would be an advantage to have had experience in the electricity supply industry, preferably on the technical side.

The successful applicant will be required to operate in the Association's London and south-eastern area and to reside in or near London.

The commencing salary will be £750, rising by three annual increments of £50, to £900.

In the first instance, application for fuller particulars of the appointment should be made to the undersigned not later than March 10.

J. F. WALLACE,
General Secretary.

102 St. George's Square,
London S.W.1. (K 17)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are now invited for the appointment of SHIFT CHARGE ENGINEER at the Bromborough New Power Station. Salary, Class "H," Grade 7, £692/£722 per annum. Applicants should have had a good general and technical education and be experienced in the shift operation of a modern generating station. Membership of the Institute of Electrical or Mechanical Engineers will be an advantage. The appointment is superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme, and may be subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and returned to him not later than Friday, March 23, 1951.

A. R. COOPER,
Divisional Controller.
(K 69)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the position of SENIOR ASSISTANT (PUBLICITY) in the Chief Commercial Officer's Department at Area Headquarters. Applicants, aged 30-35, should be thoroughly conversant with press advertising, exhibition work and other sales promotion activities. Some knowledge of typography and layout is desirable but not essential. Experience of the electricity supply industry would be an advantage. Salary will be within Grade 6 of the Permanent Salary Agreement of the National Joint Council (Administrative and Clerical Grades) i.e. £630 to £705 per annum. The successful candidate will be required to contribute to the British Electricity Authority and Area Boards' Superannuation Scheme and may be required to pass a medical examination. He will also be required to reside within reasonable distance of Board Headquarters. Forms of application may be obtained from the Secretary, The South West Scotland Electricity Board, 62 Dalziel Drive, Glasgow S.1, and should be returned not later than 14 days after the appearance of this advertisement.

J. MEEK,
Secretary.

February 23, 1951. (K 68)

NORTH WESTERN GAS BOARD

NORTH Western Gas Board, Liverpool Undertaking, has a vacancy for an ELECTRICIAN. The man appointed must be experienced on electric motors, starters and repairs and be familiar with major installation work, 400 volts, 3-phase supply both d.c. and a.c. The successful applicant will be required to pass a medical examination.

Applications to be sent by letter to the Chief Personnel Officer, Radiant House, Bold Street, Liverpool 1. (K 67)

ELECTRICAL/MECHANICAL INSPECTOR

An Electrical-Mechanical Inspector is required by a major British Oil Company for service in the Middle East. Applicants must have wide experience covering maintenance and inspection of installed plant associated with modern large generating stations with voltege range of 33 kV to 440 volts. Knowledge of flameproof switchgear an advantage. Possession of H.N.C. essential and qualifications up to A.M.I.E.E. desirable. Age limit 37 years. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages, kit allowance, free medical attention, good leave arrangement, pension scheme.

Write, giving personal particulars, and details of qualifications and experience, quoting Dept. F.7, to Box 3291 at 191 Gresham House, London, E.C.2. (H 270p)

A REPRESENTATIVE required in London for calling on Government departments and electrical wholesalers. Young man preferred. Experience and selling ability essential.—H. Frost & Co. Ltd., Fieldgate, Walsall, Staffs. (K 34)

APPLICATIONS are invited by the English Electric Co. Ltd. from YOUNG ENGINEERS of Graduate or Higher National Certificate standard in electrical engineering with completed recognised apprenticeship, for tendering and contracts department at the Company's various works handling turbines and other prime movers, electrical plant and apparatus. Selected applicants will, where necessary, be given a short course of preliminary instruction commencing early April and will receive full pay during training. The positions are permanent and progressive, and offer excellent opportunities in the field of commercial engineering.—Applications, quoting ref. 348B, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (K 55)

APPLICATIONS are invited for an ENGINEERING APPOINTMENT in India. Applicants who should be below the age of 35 years must have graduate (or equivalent) qualifications in mechanical, civil and/or electrical engineering, with a good working knowledge of all three branches. A thorough knowledge of electrical engineering is essential. Salary offered will depend on qualifications and experience; there are good prospects of advancement for the right man.—Write Box "R.K.", c/o J. W. Vickers and Co. Ltd., 7/8 Great Winchester Street, London, E.C.2. (K 21)

APPLICATIONS are invited for a number of vacancies for ELECTRICAL ENGINEERING SENIOR DRAUGHTSMEN for the installation of electrical equipment in large civil and military aircraft. Some knowledge of electronic equipment is desirable and possession of O.N.C. or H.N.C. (Elect.) preferable. The vacancies are for Cricklewood and Radlett (Herts) drawing offices. Further vacancies exist at Cricklewood only for Junior Electrical Engineering Draughtsmen for detailing the above work. The positions offer excellent opportunities for advancement to keen men. Write, stating age and full details of experience and qualifications, to: Staff Officer, Handley Page Ltd., Cricklewood, London N.W.2. (H 686)

APPLICATIONS invited from recently qualified young men with good Honours Degrees in Electrical Engineering for initial further practical training in this country prior to overseas service with large Middle East Oil Company. Must be single. Pensionable posts, carrying substantial salary and allowances.—Write, with full informative detail and quoting No. 18, to Box 4008, c/o Charles Barker & Sons Ltd., 32 Budge Row, London E.C.4. (K 25)

CABLE MANUFACTURERS require TECHNICAL ASSISTANTS in their Construction Department in London, age 20-25. Applicants must at least have qualified to the Higher National Certificate standard in Electrical Engineering or its equivalent.—Apply in writing, giving particulars of qualifications and experience, to Staff Officer, Milton Court, Dorking, Surrey. (K 56)

ELECTRICAL ENGINEERS are required for the High Voltage Section of the Nelson Research Laboratories of the English Electric Co. Ltd., Stafford. Applicants should possess a degree in electrical engineering and have a sound knowledge and experience of H.V. problems and heavy electrical equipment.—Write, giving full details, quoting ref. 229C, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (K 27)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

SWITCHGEAR

JOHNSON AND PHILLIPS LIMITED require TWO SENIOR DRAUGHTSMEN. Applicants must be suitably qualified and competent to handle switchgear for indoor and outdoor main stations and substations up to 33,000 V, or to design switchgear apparatus embracing air-break and oil-break circuit-breakers. Both positions offer good scope to the right man with prospects of early promotion. Applications in writing, stating age, experience and salary required, to: **Emoloyment and Welfare Manager, JOHNSON & PHILLIPS LTD., CHARLTON, LONDON S.E.7** (H 618p)

ASSISTANT ENGINEER for London office with experience of design, detailing and scheduling of overhead transmission lines and underground cables.—Write, Box No. 275, c/o Walter Judd Ltd., 47 Gresham St., E.C.2. (H 743)

ELECTRICAL DRAUGHTSMEN wanted for long-term oil refinery and chemical plant programme. Five-day week, pension and insurance plan.—Write, stating experience and salary required, to: Chief Engineer, E. B. Badger and Sons (G.B.) Ltd., 40 Parkgate Road, Battersea, London S.W.11. (H 745)

ENGLISH ELECTRIC, Stafford, require TRANSFORMER DESIGN ENGINEERS for high power systems. Good engineering qualifications desirable and practical experience on transformer design problems essential.—Write, giving full details and quoting Ref. 225E, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (H 692)

ESTIMATOR required with experience in preparing tenders for all classes of a.c. and d.c. electrical rotating machinery, switchgear, etc., and familiar with standard specifications. 5-day week. Pension scheme.—Applications should state age, full details of experience, salary expected, to Personnel Manager, Lancashire Dynamo and Crypto (MFG) Ltd., Trafford Park, Manchester 17 (K 26)

FERRANTI LIMITED invite applications for SENIOR APPOINTMENTS of graduate engineers with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quote Reference M.E. (H 603)

JUNIOR DRAUGHTSMEN required having knowledge and experience of cable accessories and joint boxes. —Applications in writing, giving particulars of training experience, age and salary required, to Employment and Welfare Manager, Johnson & Phillips Ltd., Charlton, S.E.7. (K 28)

JUNIOR ENGINEER required for electrical contractors' estimating department, Westminster district.—Write, Box No. 4011, Electrical Times. (K 2)

LANCASHIRE DYNAMO AND CRYPTO, Trafford Park, have a vacancy for a SENIOR DRAUGHTSMAN capable of preparing own calculations. Five-day week. Pension scheme.—Applications, stating age, experience and salary required should be addressed to the Personnel Manager. (K 12)

LONDON TRANSPORT EXECUTIVE invites applications from CHEMISTS for a vacancy in its Laboratory Service. The successful candidate will be in immediate charge of a power station laboratory in the N.W. or S.W. area of London. The activities of these laboratories are co-ordinated under a senior chemist. Industrial experience in the examination of solid and liquid fuels and in the treatment of boiler feed water, together with analytical control of water treatment processes, is essential. Possession of an honours degree would be an advantage. The salary range for the post is £600 per annum, rising by annual increments of £20 to £700 per annum, with prospects of further advancement. Commencing salary within this range according to qualifications and experience. The appointment is subject to a medical examination. Upon completion of a satisfactory probationary period of one year, the selected applicant will be expected to join a contributory superannuation scheme.—Applications, giving full details of age, training, experience and present salary, should be sent within 14 days of the appearance of this advertisement to the Staff Officer (FEV 165), London Transport Executive, 55 Broadway, London S.W.1. For acknowledgement, enclose addressed envelope. (K 13)

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Large electrical company requires EXPERIENCED CIVIL, ELECTRICAL and MECHANICAL ENGINEERS, DRAUGHTSMEN and TECHNICIANS. Excellent opportunities. Call, or write, stating experience:

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ELECTRICAL ENGINEER

Required by old-established Company in India. Age 22 to 28. Preferably unmarried. Should hold good degree in technical science or electrical engineering with two years' practical experience with an approved British manufacturer. Preference given to man having experience with switchgear manufacture and estimating. Three years agreement. Salary 1,100 rupees per month for first year, increasing 100 rupees per month yearly, plus allowance 250 rupees. Provident Fund. First class passages and six months' leave from India if re-engaged after termination of agreement.—**Box No. 4013, Electrical Times.** (K 16p)

METER TESTER required, able to take charge of repairs and testing all types of meters.—Apply in writing, giving age, experience and wages: Electric Meter Co., Castor Road, Brixham. (H 552)

PURCHASING AGENT required in London by old-established Midland engineering and manufacturing firm. Commission on purchase of raw materials and components.—Box No. 4021, Electrical Times. (K 33)

QUALIFIED ELECTRICAL ENGINEER required for work in London, must possess comprehensive knowledge of electrical installation work in all types of buildings, and be fully conversant with the recognised wiring systems and all regulations governing this type of work. Knowledge of building construction and ability to read architects drawings essential. Able to prepare electrical specifications and illumination schemes.—Write to Box No. 7858, c/o Whites Ltd., 72/8 Fleet Street, E.C.4, giving details of age and experience. (K 54)

QUALIFIED TECHNICAL ASSISTANT required for Laboratory Duties, which include design, development and testing work, with large manufacturers of electrical appliances in the Dudley area.—Applicants must state age, qualifications, experience and salary required to Box No. 4017, Electrical Times. (K 23)

SALES MANAGER required by well-known company manufacturing electrical resistance alloys. The post calls for a man experienced in the electrical trade and capable of negotiating at high level by personal contact. —Please submit full details, in confidence, to Box No. 3095, Electrical Times. (H 706)

SENIOR DRAUGHTSMAN required for work on power transformers ranging from 100 kVA up to 3,000 kVA, 66,000 V. Ordinary National Certificate in Electrical Engineering preferred. Salary according to age and qualifications.—Apply to Personnel Officer, Foster Transformer and Switchgear Ltd., South Wimbledon, S.W.19. (H 624)

SENIOR ENGINEER required by Electricity Supply Undertaking, under European management, near Calcutta. Salary: 1st year, Rs.1800 per month; 2nd year, Rs.1850 per month; 3rd year, Rs.1900 per month; 4th year, Rs.2000 per month. (Note: Rs.2000 per month is approximately equivalent to £1,800 per annum,) plus servant allowance, but no other extras. Compulsory Provident Fund is additional benefit. Free furnished quarters in European compound, with medical attention, free electric light and fuel. Liberal leave rules with free passages both ways; and if married, for wife and children under 12 (maximum three). Qualifications: Good technical training and generation experience in a modern power station of not less than 30 MW. Knowledge and experience of distribution, meters and protective gear. Administrative experience and Corporate Membership of the Institution of Electrical Engineers would be deemed an advantage. Age limits, 30 to 40. Applications, giving full particulars of age, married or single, education, technical training and practical experience, together with copies only of recent testimonials, to be submitted on or before March 31, 1951. The selected candidate will be required to undergo a medical examination.—Write: Box "W.G.W." c/o 95 Bishopsgate, London E.C.2. (K 58)

SIMON HANDLING ENGINEERS LTD., manufacturers of mechanical handling equipment, have vacancies for ELECTRICAL ENGINEERS IN POWER SECTION. (1) Age 35 to 40 years, must have university degree and be capable of working on own initiative; good prospects and salary. (2) Age 24 to 30 years with degree or equivalent in electrical engineering, drawing office and practical experience an advantage. Salary according to experience and qualifications.—Write for either vacancy, stating full details of age, experience and qualifications to Personnel Director, Henry Simon Ltd., Cheadle Heath, Stockport. (K 8)

THE EASTERN ELECTRICITY BOARD require a METER TESTER AND REPAIRER at Colchester with experience of repairing and testing a.c. meters, including polyphase and maximum demand attachments in accordance with the requirements of the Electricity Supply (Meters) Act, 1936. Ability to repair time switches would be an advantage. N.J.I.C. conditions will apply, the rate of pay being 3s. 0½d. per hour (44-hour week).

Apply in writing, giving details of age and experience, to the Manager, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk. (K 57)

SHORT-CIRCUIT TEST ENGINEERS are required for the Nelson Research Laboratories of the English Electric Co., Ltd., Stafford. Applicants should possess a degree in electrical engineering and have experience of the operation and maintenance of heavy electrical plant. Duties will include the testing of heavy switchgear, and applicants must be interested in development work.—Write, giving full details, quoting Ref. 299D, to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (K 10)

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THE opportunity exists for the employment of a QUALIFIED ENGINEER in the management of a successful old-established company manufacturing electrical switchgear. He should have scientific and commercial qualifications as well as practical experience. Good salary and prospects for a suitable person.—Box No. 3099, Electrical Times. (H 715)

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TRANSFORMER TEST ENGINEER required by a large manufacturing organisation. Applicants, who should preferably hold the Higher National Certificate, must have first-class experience in the testing of all types of power and instrument transformers, and the ability to control staff.—Reply, giving full details of qualifications and experience, together with age and salary required, to Box No. 4015, Electrical Times. (K 20

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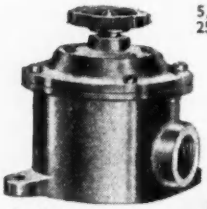
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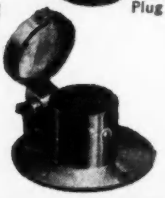
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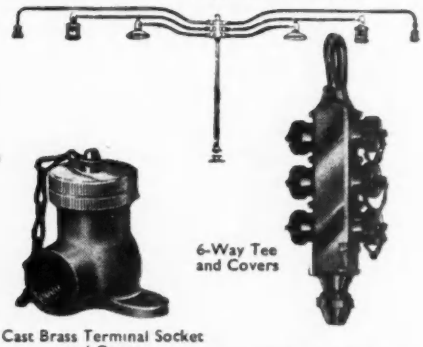
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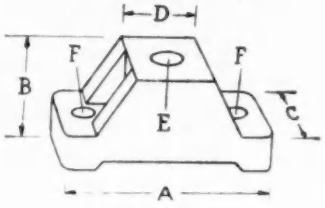

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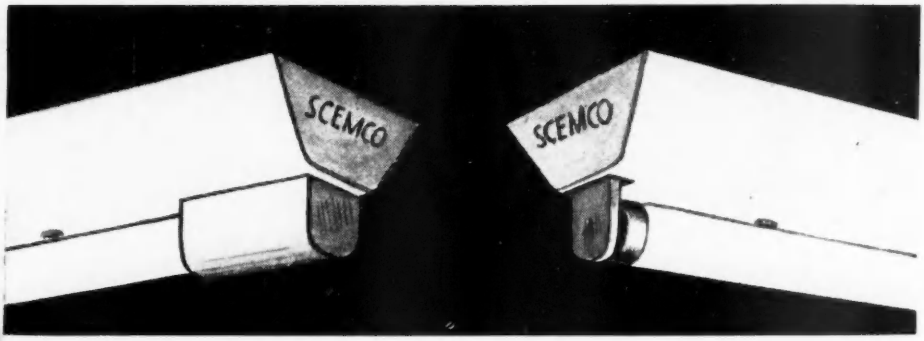

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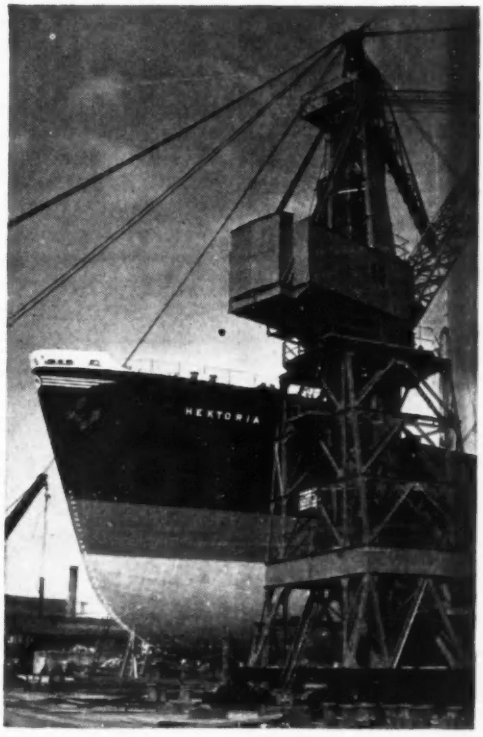

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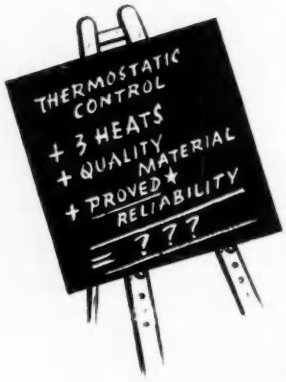

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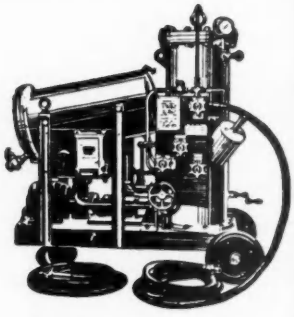

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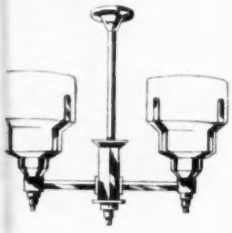

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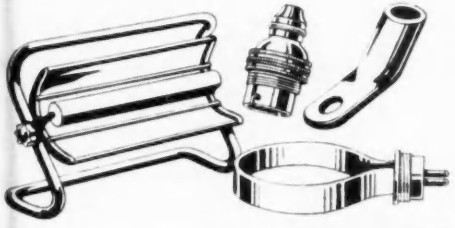

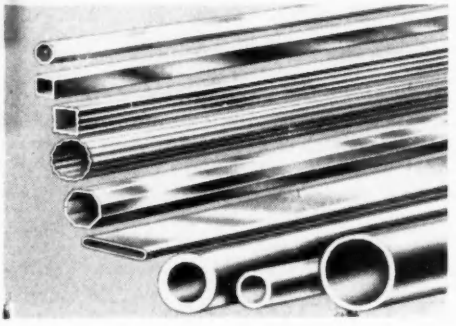

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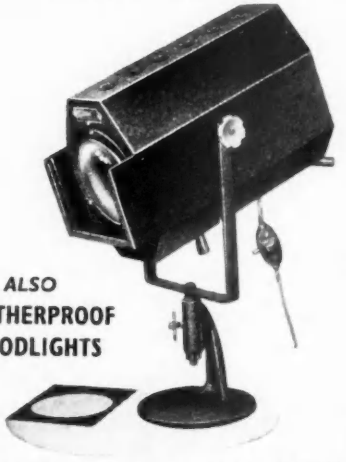

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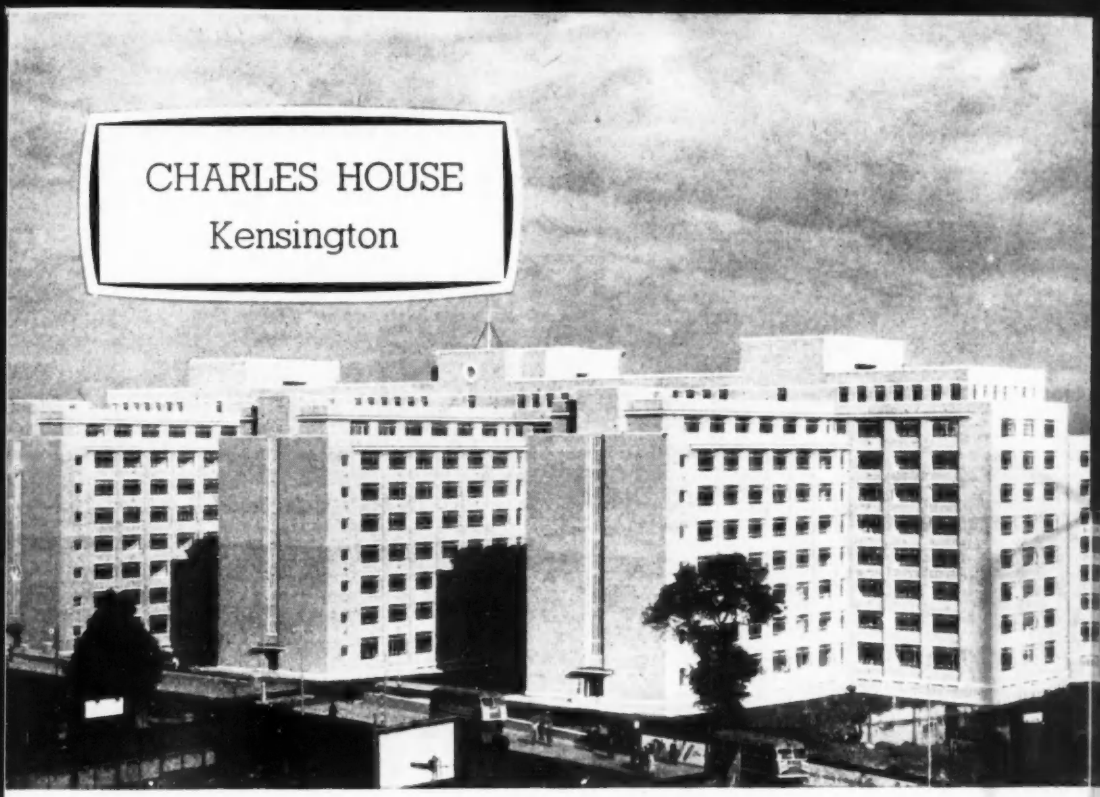

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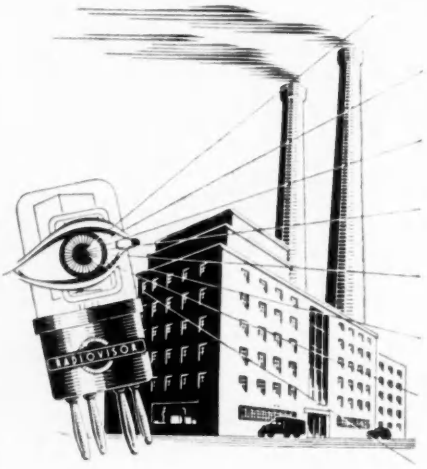

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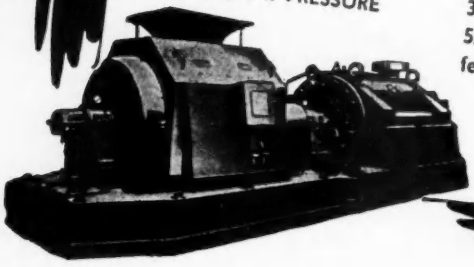

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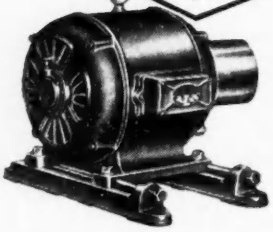

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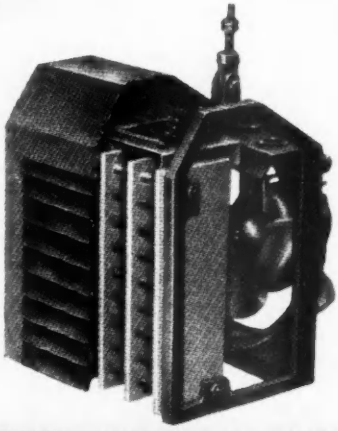

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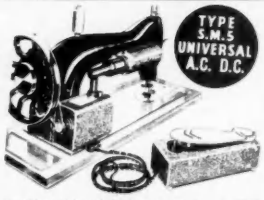

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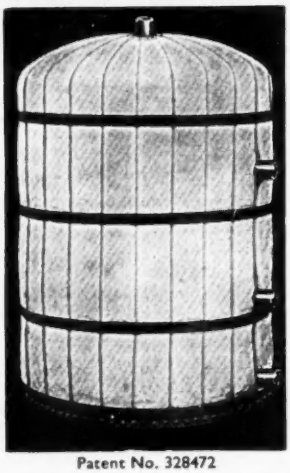

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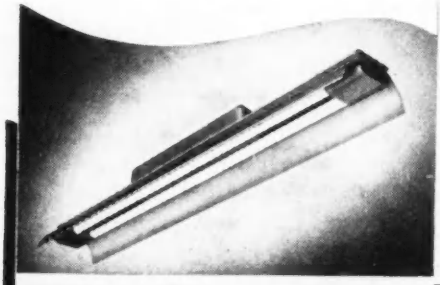

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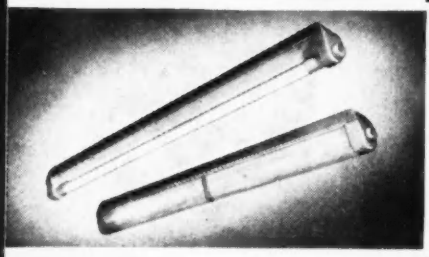

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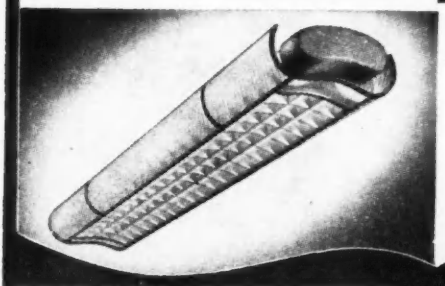

GN/2040.

No photograph can do justice to the GN 2040, in its decorative diffuser. The downward light from the louvres, the soft glow through the side panels, make it a fountain of light. It carries two 4 ft. 40 watt lamps.

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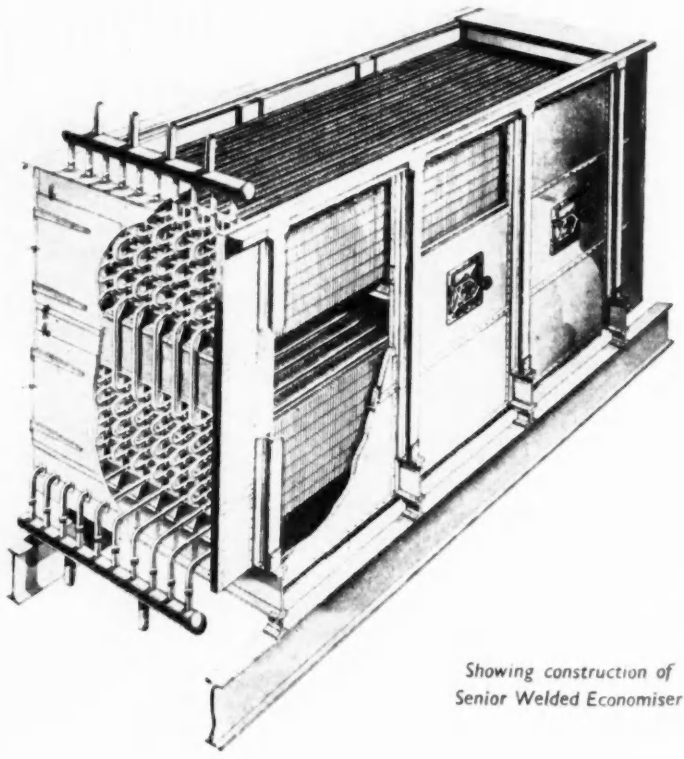

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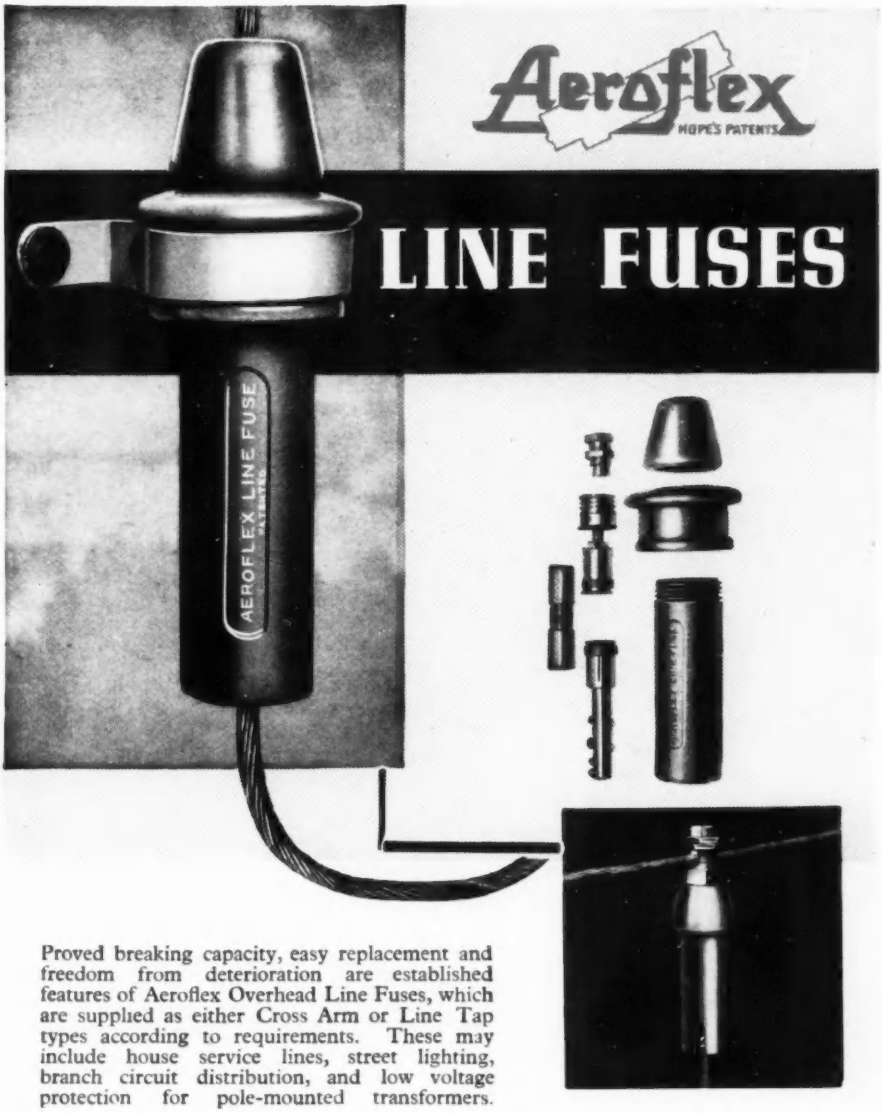

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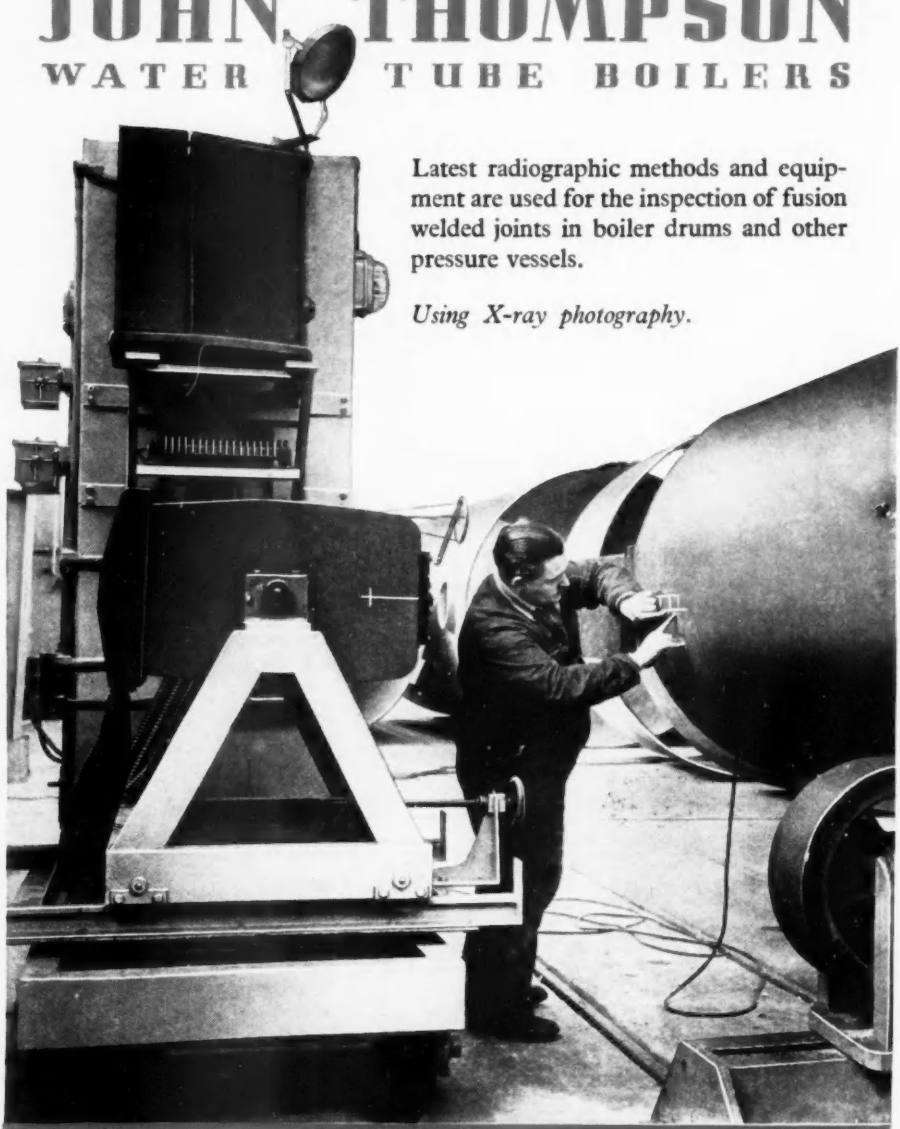

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